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Contractors and Engineers Monthly

Vol. 35, No. 12 DECEMBER, 1938 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Georgia's First Super-Highway**
  The design of the 17-mile Metropolitan Highway leading into Atlanta from the north, the first super-highway in Georgia, consists of two 20-foot concrete pavements with lip curb, a 4-foot dividing center strip and 8-foot shoulders. One of the first contracts, a 1.9-mile stretch in Cobb County, was completed by Pitman Construction Co. last summer. See page 2.

- **Fighting Snow in Vermont**
  The Green Mountains in Vermont have been a separating factor in the state since it was founded and, before the days of modern snow removal methods, no traffic crossed the mountains during the winter. Now light trucks and blade plows keep the 1,735 miles of state highway open to traffic all during the long cold Vermont winters. See page 2.

- **Arc-Welded Grade Separation**
  An abstract of one of the prize-winning papers in the James F. Lincoln Arc Welding Foundation Award on an arc-welded grade separation structure outlines the design of the structure and the resulting economies from the use of electric welding. See page 5.

- **Labor Relations**
  One of the most vital problems in all industry today is that of labor and its relations to employers. Some aspects of labor relations in the construction industry and some of the problems which must be solved are discussed by Edward P. Palmer, A. G. C. President. See page 11.

- **Hot-Mix on Tar Base**
  A tar-primed base and binder and surface courses of hot mix were called for in the Central Paving Co.'s 8.76-mile paving contract north of Columbus, Miss., last summer. See page 14.

- **Grand Coulee Concrete Trestle**
  The 3,600-foot steel concreting trestle to complete the high dam at Grand Coulee was erected in record time with two traveling stiffleg derricks and a crew of seventy-five trained steel workers. See page 21.

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C. & E. M. Photo
Heavy Cuts on New Location of U. S. 19 Near Bryson City, N. C.

North Carolina Relocates U.S. 19

Nello L. Teer Finishes Grade And Drainage Structures and Lays T. B. M. Surface Near Bryson City

✦ REMOVING many degrees of curvature and bad corners from 9.3 miles of U.S. 19 southwest of Bryson City, the North Carolina highway engineers have brought forth criticism from local scenery lovers of the horse and buggy days. "All the charm and loveliness have been taken from the road to Almond and Wesser," said one prominent resident of Bryson City when interviewed, but another present promptly replied, "Wow, but what time you can make now without risking your neck every few hundred feet." There you have the conflict of opinion inevitable with every road improvement today when curves are eliminated in the interest of safety and improved highway transportation costs.

The contracts for State Projects 9800 and 9803 for a total of 9.3 miles of grading, structures and T.B.M. (traffic-bound macadam) base were awarded to Nello L. Teer of Durham, N. C., in combination with Hobbs Peabody Construction Co. of Charlotte, N. C., who built the high bridge to be described in a later article. The work started near Wesser and continued northeast to about 1½ miles beyond the intersection of Route 286, a winding mountain road being improved this year. The contracts ended about 5 miles from Bryson City. Grading for Project 9800 was completed in 1937 and the remainder of the contracts completed in 1938.

A Trip Over the Work

Starting at the west, or Wesser, end at Station 0+00 the road runs close to the river and has been widened considerably. At Station 7 there is a 40-foot triple culvert of 7 x 9-foot barrels to take care of a branch that flows into the

(*Continued on page* 12)

Novel Gravel Plant Cuts New-Road Costs In Louisiana Parish

(*Photos on page* 32)

✦ THE REAL heart of Ouachita Parish road activities is at the Parish Airport, Selman Field, on the east side of the Ouachita River which divides the parish, at Monroe, La. Inasmuch as there are no road supervisors, district foremen or others to supervise the road work, the responsibility falls entirely on the shoulders of Joe G. Ford, who can seldom be found at his office and as the thirteen Police Jurors know, at home only sometime between 12:30 and 2 when he is having his lunch. At other times his hat and his Parish Oldsmobile comprise his office as he moves from one part of the 525 square miles of the parish to another over its 620 miles of roads.

The Road Department and Its Work

Some idea of the widely varied character of the work performed by the Ouachita Parish Road Department may be gathered from the following typical activities. Fifty per cent of the cost of operating the road department on construction projects east of the Ouachita River is for drainage while only 25 per cent of the expense goes for that work on the higher lands of the west side.

A 32-mile lake, Lake DeSiard, runs through the parish and furnishes the water supply for Monroe. It is an old loop of a bayou that has been separated from the main stream for a great many years. The land beyond the lake was almost completely isolated from the remainder of the parish in spite of the fact

Ouachita Parish Has Three Centers for Equipment, the Largest at Airport; Adds 200 Miles in 2 Years

that it is within ¼ mile of the city limits of Monroe. A WPA project was instituted to construct a dam and roadway across one section of the lake with a controlling gate so that residents could reach the 1,200-acre tract on the opposite shore without a 10-mile ride. This project alone has opened up 4 miles of the lake front to real estate activity and the increased values will in a few years more than pay off the costs to the Parish.

Another project was the construction of a tuberculosis hospital in which the Parish acted as sponsor with the Parish Highway Department doing the engineering work and the local tuberculosis association furnishing the money for the materials.

A sidelight on the character of the roads in the old days in this parish is furnished by the story of some work done in slavery days and its recent coming to light. An old road built in those days through a cypress brake was rebuilt recently as a part of the WPA program. One of the men connected with the new work recalled that he had heard his father recount that, when the original road was put through, the foundation was so soft that a mule which ventured off the side of the road bogged down

(*Continued on page* 8)

GOOD TEAMWORK MANEUVERS GIANT GIRDER

U. S. Bureau of Reclamation Photo
A 97-Foot 38-Ton Girder, Bound for the Concreting Trestle at Grand Coulee, Mounted on Two Trucks, the Drivers of Which So Coordinated Their Movements That the Girder Was Safely Transported Up and Down Hill, Through Three Towns and Finally Landed at the Dam Site. See Page 21.

New Metropolitan Highway Built North of Atlanta, Ga.

Pitman Construction Co. Completes 1.9 Miles of 4-Lane Divided Highway On State Route 3

✦ THE first super-highway in the state of Georgia is under construction to furnish an adequate entrance to Atlanta from Marietta on the north. One of the first paving contracts to be completed on this 17-mile metropolitan highway was WPMH 535-D, 1.9 miles in length in Cobb County north of the Chattahoochee River, by the Pitman Construction Co. of Atlanta, Ga.

The highway consists of two 20-foot pavements with lip curb and a 4-foot dividing center strip. Eight-foot shoulders on the outsides provide ample space for disabled vehicles to park off the pavement and slopes of 3 to 1 up to 10 feet add further safety to the design. Beyond the 10-foot depth the slopes are 1½ to 1. The pavement section was 9-6-9-inch with the center 14 feet being 6 inches thick and the pavement increasing in thickness to 9 inches at the edge. The lip curb built on both sides throughout the length of the work was 3 inches high and 9 inches wide. The pavement has no crown but a flat slope from the inside to the shoulder amounting to 2 inches. The drainage ditches are uniformly 2 feet wide with a flat bottom and 2 feet deep. The back slopes are 1 to 1. Some criticism of these steep slopes might be made as far as the attractiveness of the highway is concerned were it not for the fact that some of the cuts are 50 feet deep which would have made it prohibitive to lay back the slopes on the accepted 4 to 1 for super-highways. Furthermore, most of these cuts were in rock.

Grade Preparation

The subgrade was roughed in with a Caterpillar 12-foot blade pulled by a Caterpillar Sixty and then the form trench was cut with a Carr Formgrader. A crew of six men cleaned the form trenches and then a form-setter with four laborers set the Blaw-Knox forms and four other laborers hand-tamped them. One man and two laborers were used to line up the forms and another man used an oil spray to oil the forms. An R-B power subgrader was pulled over the forms by cables to cut the subgrade to the proper smoothness ahead of the paver. On the subgrade behind the subgrader the contractor used a 10-ton Buffalo-Springfield roller to compact the earth ahead of the paver to insure a firm foundation for the concrete.

C. & E. M. Photo

A Drop Inlet Spillway with Cast-Iron Grating

Concreting

The contractor set up his batching plant at about the middle of the job, just off the east pavement at Vinings. Paving was started at the north end on the east slab and continued through to the river at the south end of the job. Then the paver returned to the north end of the west slab and paved to the entrance for the batch trucks and returned to the south end and paved back to the batching location.

The batching plant consisted of a Northwest crane and clamshell unloading the sand and crushed stone from gondola cars and loading the bins of the Butler batching plant. The batches consisted of 1,229 pounds of sand, 2,353 pounds of crushed stone, 611 pounds of cement and 40.3 gallons of water per batch. For the cement four men weighed out the amount of cement necessary to bring up the 6 bags of cement to 611 pounds and placed the extra cement in another bag. The bags were placed on the batches by the four men as the trucks, all 2-batchers, drove up to the cement platform. The fleet of 9 to 14 trucks had a 1½-mile dead haul from the batching plant to the job, over a rather rough road. When they reached the job they turned through an opening in the forms and then four men climbed onto the trucks, one clipped the bags, two dumped the cement and one baled the empties.

Water for the paver and for curing was provided by a Novo triplex pump located at the quarter point of the job and delivering water through the 2½-inch pipe line which had the paver hose valves at 100-foot intervals. The paver carried 150 feet of hose.

As the trucks backed to the paver skip one man handled the dumping at the Koehring 27-E paver. There were two men shoveling the excess dirt from the subgrade planer and removing the fillet of dirt against the forms. Four men placed the center steel and the dowel assemblies at the expansion and the contraction joints. One man assembled the dowel bars on the shoulder of the road. The center steel was placed to within ½

(*Continued on page 16*)

C. & E. M. Photo

A Section of the New Double-Lane Highway Entering Atlanta from the North

Metropolitan Water District Photo

A Novel Rolling Bridge Solved the Problem of Getting Concrete Across Open Canals

Unique Bridge Solves Concreting Problem

In order that fencing operations might be carried on simultaneously on both sides of the open canals of the Colorado River Aqueduct, a rolling bridge was designed by Garlinghouse Bros., of Los Angeles, for the Pittsburgh Steel Co. It solved the problem of getting concrete, used for setting steel fence posts, across the 60-foot canal. The bridge effected both speed and economy by making possible a continuous operation of pouring, post setting, and fence stringing.

Served from a mixer on one side of the canal, the crews were able to pour the concrete directly from the end of the bridge into a prepared hole on the other, and then move quickly and easily forward the 12 feet to the next. The bridge was propelled by a hand crank.

All the open work along the Aqueduct was enclosed by 152 miles of 6-foot high steel-mesh fence topped with strands of barbed wire and supported by steel posts set in concrete. The total contract price was $413,077. The Los Angeles Fence Co. fabricated and built the fence for the reservoirs, and the Anchor Post Fence Co. and the Pittsburgh Steel Co. for the canal enclosure.

Regular Patrolmen Fight Vermont Snow

Green Mts. Divide State And Receive Bulk of Snow; Hired Trucks Cheaper Than Maintaining Heavy Units

(*Photo on page 32*)

✦ THE entire state highway system of 1,735 miles in Vermont is maintained clear of snow in winter, with the exception of the Smuggler's Notch Road which is of interest to commercial and tourist traffic travel only in summer. Its elevation is 2,162 feet. The 250 patrolmen who maintain the roads throughout the year are the backbone of the winter snow-fighting force. Operating individually in the twelve maintenance districts these men have light trucks on which state-owned blade plows with curved moldboards are mounted in winter. In addition, state-owned blade plows are put on hired trucks as the state highway department has found it less expensive to hire the required trucks for emergency service than to maintain the necessary large heavy-duty fleet throughout the year. In addition, the state pays certain towns for plowing state-aid roads when the towns have adequate equipment. The payment is made on a mileage basis with the maximum payment being $50 per mile in a single fiscal year.

Organization

The maximum snowfall is in the north and south Green Mountain chain where about 100 inches falls each winter. In the remaining sections of the state east and west of the mountains the annual snowfall ranges between 50 and 65 inches. The wall of mountains has been a separating factor in the history of the state since it came into being. Before the days of snow removal the quotation "East is East and West is West, and never the twain shall meet" from Kipling was all too true. The mountains were never crossed by any kind of traffic during the winter and politically the two parts were independent. For 75 years the governors were chosen alternately from east and west of the Green Mountains.

On the wall of the office of Hubert E. Sargent, Commissioner of Highways and Chief Engineer, State Department of Highways, in Montpelier, hang a series of maps on rollers and each contains pertinent information on the highways of the state. One of these maps shows the names, addresses and routes covered by each patrolman and his telephone number, as well as the location of the major township equipment such as: Shoreham, diesel 45 tractor, Sargent plow; Addison Township, 5-ton Walter truck, Frink plow. Time is saved by having this information in the headquarters' office as well as in the district offices. Complaints are usually registered at headquarters and a telephone call straight through saves time and speeds action.

Methods

Prior to 1937 plowing was started when 3 inches of snow had fallen, but now the orders are to start when there is any plowable accumulation of snow. The light fast trucks and plows handle the snow as it falls and plow a two-lane strip 20 or 22 feet wide. The state owns no rotary plows as they are considered too slow for the work in Vermont. The curved moldboards on the Ross and Frink plows throw the snow in a sheet when running at a reasonable speed so that there is little chance for it to accumulate on the road and it does not build up on the shoulders as it is thrown beyond them.

As a further aid to insuring the speedy removal of snow, the plow routes have been shortened from 25 miles per unit to 15 to 20 miles, allowing greater frequency of plowing. A snow that is traffic packed is practically impossible to remove economically.

The decision whether to use the patrol-

(*Continued on page 30*)

VERMONT 1937-1938 WINTER MAINTENANCE COSTS

Dist. No.	Total Miles	Snow Removal Cost	Snow Removal Per Mile	Sanding Cost	Sanding Per Mile	Snow Fence	Misc. Work	Total Cost	Per Mile
1.	126.36	$6,396.25	$50.62	$18,425.22	$145.82	$2,117.58	$5,731.66	$32,670.71	$258.55
2.	100.21	4,262.85	42.54	12,552.23	125.26	1,479.17	3,342.17	21,636.42	215.91
3.	135.22	4,221.07	31.22	14,020.52	103.69	1,579.94	2,351.64	22,173.17	163.98
4.	134.03	3,825.73	28.54	13,898.00	103.69	675.59	5,008.26	23,407.58	174.64
5.	176.51	5,453.19	30.89	21,020.47	119.09	773.82	3,735.95	30,983.43	175.53
6.	139.58	3,505.52	25.11	8,859.21	63.47	3,620.71	2,230.66	18,216.10	130.51
7.	138.17	3,715.19	26.89	15,242.46	110.32	402.79	2,864.41	22,224.85	160.85
8.	157.88	5,704.74	36.13	22,840.96	144.67	3,548.66	2,049.19	34,143.55	216.26
9.	159.93	6,636.24	41.49	27,143.77	169.72	1,414.31	3,416.11	38,610.43	241.42
10.	142.23	5,212.62	36.65	24,788.79	174.29	946.11	3,574.26	34,521.78	242.72
11.	148.62	4,261.47	28.67	20,284.14	136.48	3,911.41	2,204.61	30,661.63	206.31
12.	190.84	7,344.53	38.49	18,499.96	96.94	4,025.00	3,071.81	32,941.30	172.61
Total	1,749.58	$60,539.40	$34.60	$217,575.73	$124.36	$24,495.09	$39,580.73	$342,190.95	$195.58

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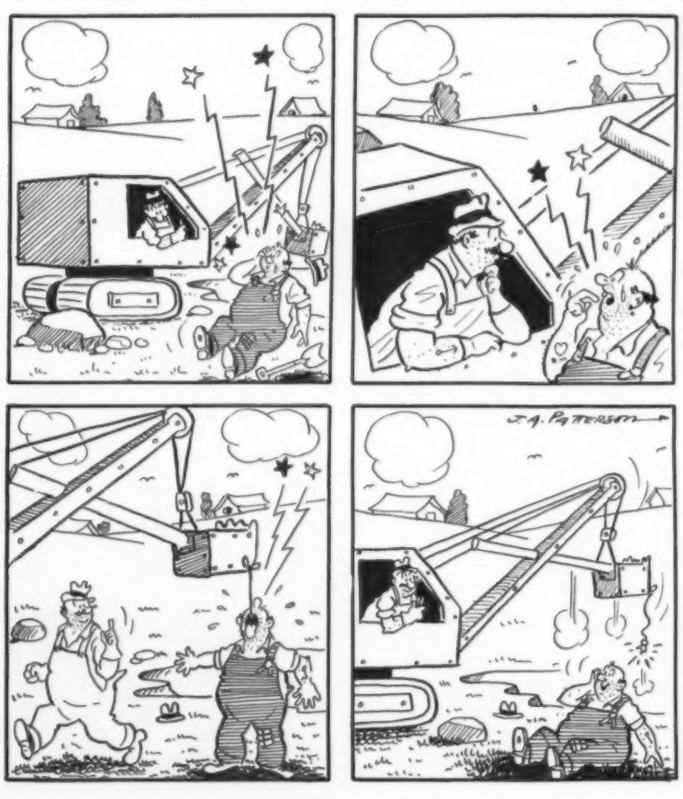
For Men Only—Maintenance Men!

We have used these columns from time to time in the cause of highway safety and the very definite contribution which can be made by the maintenance forces of state highway departments toward safer roads for the traveling public. Among the points for correction are the corrugations in the road surface on the inside of curves, the "Men Working" signs left in place when work has stopped and now we add a plea for proper parking of maintenance equipment and suggest a new sign for chatty maintenance crews.

Corrugations on the inside of curves of earth, gravel or bituminous roads cause the rear wheels of cars to bounce out at speeds far below the legal maximum, resulting possibly in sideswiping passing vehicles, or cause the vehicle itself to head into the ditch on the inside of the curve.

The evils of signs which don't mean anything have been spoken of before. After motorists have passed a number of "Men Working" signs, proceeding slowly because of anticipated work ahead, only to find nothing going on, they eventually decide it is futile to pay any attention to those signs. Another of the sign evils are the "Slow," "Danger" and "Stop" signs which wayside stands are permitted to place along the highway in an effort to secure business. Danger signs should indicate danger and nothing else—or the public soon fails to believe in signs.

However, while we stand for fewer and more effective signs, we should like to suggest one more. We have recently seen signs "Equipment Working" posted on roads and carried on maintenance trucks and graders. These are good—but patrolmen should be cautioned—yea forbidden—to stop equipment on curves, thus adding to the hazard already present at curves. On one stretch of some 100 miles of road, we recently noted six patrol graders, four of which were parked on the road and two of which were working, but all six were between "Equipment Working" signs. Of the four stopped on the road, three were on curves and the truck drivers and grader men were chatting amiably, about road conditions we hope, with groups in farmyards. We respectfully suggest that there be added to the "Equipment Working" and other signs, a new one to be used in duplicate, one placed 100 yards behind and another that distance ahead of the unmanned equipment, and the others pinned to the backs of the operators, the sign to read "Men Talking." It would be a valuable aid to motorists to be on their guard.



Detours Analyzed By Ohio Engineer

To the Editor
CONTRACTORS AND ENGINEERS MONTHLY

First we must say "Amen" to every word in Professor Petty's editorial "Who Pays for Detours?" in the November issue of your valued Monthly. As this eminent highway engineer so aptly implies, *traffic service* is the sole reason for the existence of the highway engineer as such.

Ohio has evolved a very thorough method of detour analysis. The question of necessity is studied from every important angle, and the service element is always placed first. This means that a great many projects are constructed under traffic. In not a few cases optional service is provided. Practically all small structures and some large structures are built under traffic by the use of a side-road temporary run-around structure. But there is one class of project the construction of which under traffic would work an undue hardship on traffic and make durable and satisfactory construction impossible or very difficult to attain.

We have a form (LD-Est 1) for estimating the cost to the contractor for maintaining traffic through a project under construction. This form does not of itself have any major influence in effecting an answer to the question as to whether or not there shall be a detour; it is but an evidence of intention. There is also a detour estimate form (L. and D-1) on which all essential items appear. In keeping with this approved estimate, work is performed on a detour when it is authorized.

The operations in Ohio over the last three biennia furnish an enlightening picture. In the biennium 1933-34 Ohio had 637 detours on which was spent $337,531. The biennium 1935-36 saw this reduced to 433 detours with a decrease of 24,333,000 vehicle miles, and an expenditure of $338,603. The biennium 1937-38 is not yet complete, but in the year 1937 there were 136 detours entailing an expenditure of $179,213. Over this 6-year period the annual volume of work has been fairly constant.

The statutes of Ohio require a very careful study of the detour problem in connection with any contemplated project, and also require a study of haul roads. All detours and haul roads must be conditioned in advance, must be adequately maintained, and must be reconditioned after the completion of the project.

The requirements of traffic are paramount, and although a detour is sometimes unavoidable, it is nevertheless a part of the system as long as it is operating as such.

Yours very truly,
H. S. Perry,
Maintenance Engineer,
Ohio Department of Highways
Columbus, Ohio
November 21, 1938

Problem of Detours Solved Individually

To the Editor
CONTRACTORS AND ENGINEERS MONTHLY

Our practice in the matter of detours in Kentucky is to take each individual case as it comes up. Naturally, where we have state-maintained roads available which do not penalize the traveling public too much in the way of distance these state roads are used. In other cases where we are reconstructing a main traveled road and we have county roads available, we have often surfaced these county roads and sometimes have even put bituminous surfacing on these detours. In our hilly sections where there are no other roads available, we generally provide for the road to be constructed half at a time and require the contractor to take care of the traffic over the road under construction. It is almost impossible to lay down a policy governing all cases where detours are needed.

I agree with Professor Petty in his editorial in the November issue of CONTRACTORS AND ENGINEERS MONTHLY that every reasonable effort should be made to provide a good detour. We do have some cases, however, where it would be necessary to spend as much money on the detour as on the road itself before we could say we had a satisfactory detour. We pay particular attention in our state to the adequate marking of detours so that there is little chance for traffic to get lost in following them. I have seen some states where traffic is left to fend for itself and detour marking is entirely inadequate. I do not believe that situation maintains here.

I am sure that if the traveling public would realize that detours are a sign of progress and if reasonable efforts are made for their comfort, they have no just criticism to make.

We do one other thing and that is get out detour maps three or four times a year showing roads that are under construction and roads that can be traveled and those that can not be traveled. I have not heard a great deal of complaint about our detours in this state.

I should estimate that the average cost of our detours would be something like $350.00 a mile.

Very truly yours,
T. H. Cutler,
State Highway Engineer
Frankfort, Kentucky
November 18, 1938

Voters Defeat Diversion In November Elections

Particularly significant to those interested in good highways was the action taken by voters in the November elections on the question of restricting, by constitutional amendment, the use of highway tax revenues to highway purposes, where that question appeared on the ballot.

The proposal for an anti-diversion constitutional amendment in New Hampshire was adopted by a vote of about 4 to 1. In Massachusetts a public policy question of instructing representatives to vote for a similar amendment was on the ballots in two districts, one of which answered "yes" by a vote of 3 to 1 and the other by a vote of 4 to 1. In both districts the "yes" vote was a majority of all votes cast in the election.

In California, the anti-diversion amendment was carried by a 130,000 majority and in Michigan, the amendment was carried in every county in the state, with an approximate majority of 200,000. Only in Alabama did the anti-diversion amendment fail to carry, the vote being 57,000 against and 54,000 for the amendment.

Montana voters approved Initiative Measure No. 41 which authorizes the issuance of $3,000,000 in bonds and continues the 5-cent gas tax. This in effect prevents diversion of highway revenues for the next ten years.

Help a Fellow!

You will give a fellow workman half your lunch if his is lost or full of ants. You will help him with his work if he was up half the night before on account of sickness in the family. You will take him home if his car breaks down. You will give him advice and sympathy in his troubles. But, if you see him performing a task in a clumsy or dangerous manner, do you show him the proper method? If he picks up a faulty tool, do you warn him? When you see him headed for a stumbling hazard, do you warn him, or do you say to yourself, "The darn fool will learn when he breaks his neck!"?

—H. P. Gray, Standard Oil Co. of California.

Arc-Welded Structure For Grade Separation

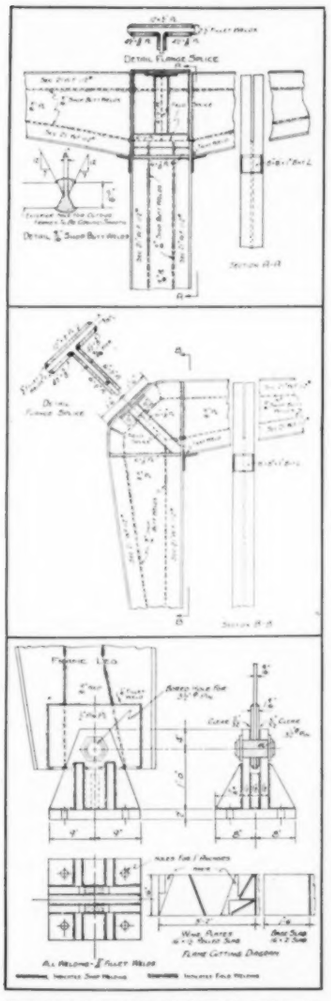
Abstract of Paper Placed Fourth Among Structural Entries in James F. Lincoln Foundation Competition

(*Photo on page 32*)

✦ A PAPER describing the proposed arc-welded two-span steel rigid-frame structure to carry Den Road, Stamford, Conn., over the Merritt Parkway about 8.1 miles east of the New York State line, prepared by Robert S. Treat and John F. Willis, Bridge Designer and Engineer of Bridge Design, respectively, of the Connecticut State Highway Department, was awarded the Fourth Main Award in the Structural Classification in the $200,000 Program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, to stimulate the wider use of arc welding.

Choice of Structural Type

The reasons for the selection of this type of structure are many, yet all converge toward the common group of objectives of safety, reasonable economy, speed in erection over a completed portion of the parkway, efficiency, appearance and adaptability to the existing conditions of the site. While realizing that economy must receive its full measure of consideration, a strictly utilitarian structure would be neither desirable nor admissable. Only a structure comparable to those now extant on this parkway and its neighbor the Hutchinson River Parkway would be tolerated.

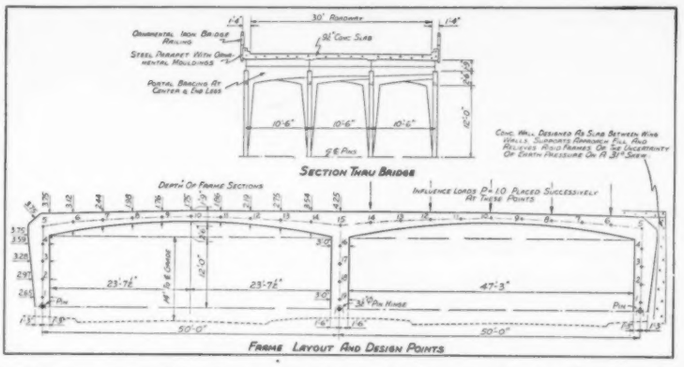


Top, Detail and Welded Field Splice at Center Pier; Middle, Detail and Welded Field Splice at Knee; Bottom, Detail of Built-Up Welded Shoe

Features of the Design

This paper was primarily intended to deal with the advantages offered by the welded type of structure over the usual riveted type. In the discussion the writers have given considerable study and frequent reference to the works of Muller-Breslau, Cross and Morgan and especially A. G. Hayden, whose valuable book "The Rigid Frame" suggested an ideal method of accumulating the moments and tabulating the results.

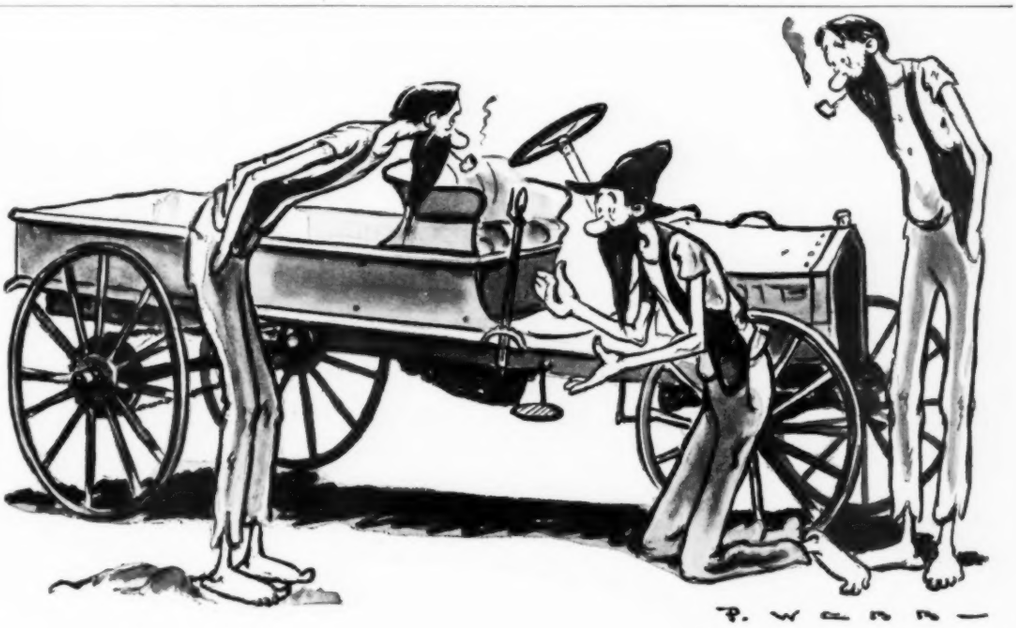
A complete design of this structure was made and all of the lengthy and somewhat laborious calculations are on file. This paper, however, includes only a skeleton of the design. The main dimensions of the frame, the span and



height, are governed by the horizontal and vertical clearance requirements and were not arbitrarily assumed. The depths of section at all points were assumed according to the usual practice.

The frame is made up of 21-inch 112-pound I-beams instead of the usual plate and angle construction. The parabolic intrados of each rib is formed by splitting the I-beams about 6 inches from the bottom flange rather than along the center line of the web, thereby facilitating the bending. The T section thus cut off is bent to shape and a section of plate 9/16-inch in thickness and having a form similar to a triangle with a curved hypotenuse is welded between

(*Continued on page 17*)



"S'pose she'd run on coal oil, Luke?"

SURE SHE WILL, Luke, if she can run at all. Fact is, most any automotive vehicle will run on most any petroleum fuel, if she'll start and if you don't care *how* she runs.

What's that? *You* want performance, economy, fast schedules from a modern high compression engine? That's different. Then *good gasoline* is the answer.

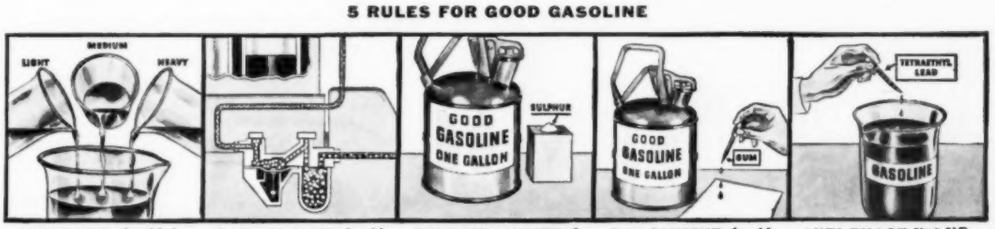
How do you know good gasoline? Ask about volatility—at what temperature vaporization begins, at what temperature the gasoline is completely vaporized. Ask about vapor pressure—how many pounds per square inch. Unless the vapor pressure fits your operating conditions, you may get vapor lock and a stalled motor.

Ask about gum content and harmful sulphur content and make sure they're low. Ask about anti-knock value, and be sure that's high.

When you buy gasoline with "Ethyl" or regular gasoline containing tetraethyl lead, you're sure you are getting high anti-knock value. These fuels measure up on the other points and give you the power and economy the manufacturer of your vehicle intended you to receive.

If you have further questions, write or get in touch with the Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y., manufacturers of anti-knock fluids used by oil companies to improve gasolines.

5 RULES FOR GOOD GASOLINE



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Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER OF THE CONSTRUCTION INDUSTRY

Member of Controlled Circulation Audit

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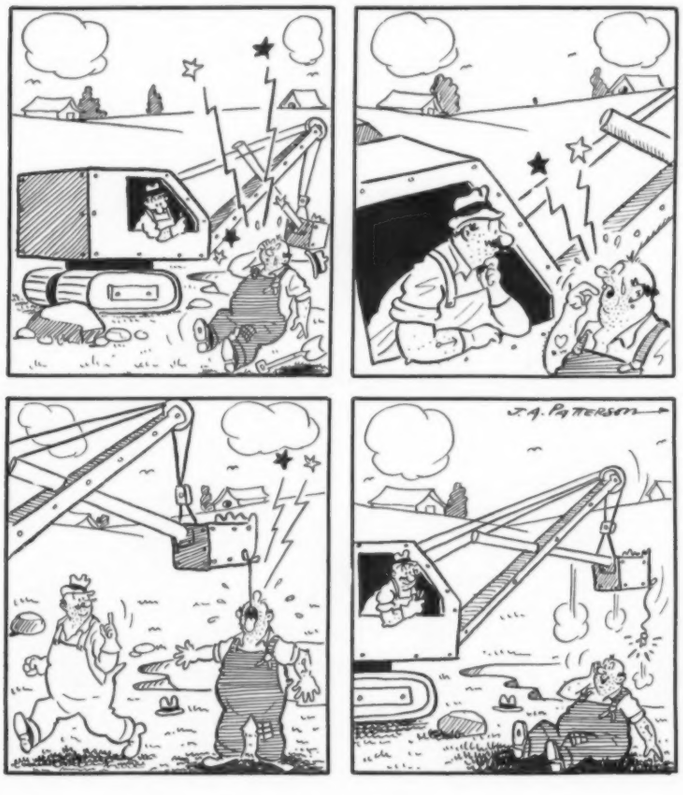
For Men Only—Maintenance Men!

We have used these columns from time to time in the cause of highway safety and the very definite contribution which can be made by the maintenance forces of state highway departments toward safer roads for the traveling public. Among the points for correction are the corrugations in the road surface on the inside of curves, the "Men Working" signs left in place when work has stopped and now we add a plea for proper parking of maintenance equipment and suggest a new sign for chatty maintenance crews.

Corrugations on the inside of curves of earth, gravel or bituminous roads cause the rear wheels of cars to bounce out at speeds far below the legal maximum, resulting possibly in sideswiping passing vehicles, or cause the vehicle itself to head into the ditch on the inside of the curve.

The evils of signs which don't mean anything have been spoken of before. After motorists have passed a number of "Men Working" signs, proceeding slowly because of anticipated work ahead, only to find nothing going on, they eventually decide it is futile to pay any attention to those signs. Another of the sign evils are the "Slow," "Danger" and "Stop" signs which wayside stands are permitted to place along the highway in an effort to secure business. Danger signs should indicate danger and nothing else—or the public soon fails to believe in signs.

However, while we stand for fewer and more effective signs, we should like to suggest one more. We have recently seen signs "Equipment Working" posted on roads and carried on maintenance trucks and graders. These are good—but patrolmen should be cautioned—yea forbidden—to stop equipment on curves, thus adding to the hazard already present at curves. On one stretch of some 100 miles of road, we recently noted six patrol graders, four of which were parked on the road and two of which were working, but all six were between "Equipment Working" signs. Of the four stopped on the road, three were on curves and the truck drivers and grader men were chatting amiably, about road conditions we hope, with groups in farmyards. We respectfully suggest that there be added to the "Equipment Working" and other signs, a new one to be used in duplicate, one placed 100 yards behind and another that distance ahead of the unmanned equipment, and the others pinned to the backs of the operators, the sign to read "Men Talking." It would be a valuable aid to motorists to be on their guard.



Detours Analyzed By Ohio Engineer

To the Editor
CONTRACTORS AND ENGINEERS MONTHLY

First we must say "Amen" to every word in Professor Petty's editorial "Who Pays for Detours?" in the November issue of your valued Monthly. As this eminent highway engineer so aptly implies, *traffic service* is the sole reason for the existence of the highway engineer as such.

Ohio has evolved a very thorough method of detour analysis. The question of necessity is studied from every important angle, and the service element is always placed first. This means that a great many projects are constructed under traffic. In not a few cases optional service is provided. Practically all small structures and some large structures are built under traffic by the use of a side-road temporary run-around structure. But there is one class of project the construction of which under traffic would work an undue hardship on traffic and make durable and satisfactory construction impossible or very difficult to attain.

We have a form (LD-Est 1) for estimating the cost to the contractor for maintaining traffic through a project under construction. This form does not of itself have any major influence in effecting an answer to the question as to whether or not there shall be a detour; it is but an evidence of intention. There is also a detour estimate form (L. and D-1) on which all essential items appear. In keeping with this approved estimate, work is performed on a detour when it is authorized.

The operations in Ohio over the last three biennia furnish an enlightening picture. In the biennium 1933-34 Ohio had 637 detours on which was spent $337,531. The biennium 1935-36 saw this reduced to 433 detours with a decrease of 24,333,000 vehicle miles, and an expenditure of $338,603. The biennium 1937-38 is not yet complete, but in the year 1937 there were 136 detours entailing an expenditure of $179,213. Over this 6-year period the annual volume of work has been fairly constant.

The statutes of Ohio require a very careful study of the detour problem in connection with any contemplated project, and also require a study of haul roads. All detours and haul roads must be conditioned in advance, must be adequately maintained, and must be reconditioned after the completion of the project.

The requirements of traffic are paramount, and although a detour is sometimes unavoidable, it is nevertheless a part of the system as long as it is operating as such.

Yours very truly,
H. S. Perry,
Maintenance Engineer,
Ohio Department of Highways
Columbus, Ohio
November 21, 1938

Problem of Detours Solved Individually

To the Editor
CONTRACTORS AND ENGINEERS MONTHLY

Our practice in the matter of detours in Kentucky is to take each individual case as it comes up. Naturally, where we have state-maintained roads available which do not penalize the traveling public too much in the way of distance these state roads are used. In other cases where we are reconstructing a main traveled road and we have county roads available, we have often surfaced these county roads and sometimes have even put bituminous surfacing on these detours. In our hilly sections where there are no other roads available, we generally provide for the road to be constructed half at a time and require the contractor to take care of the traffic over the road under construction. It is almost impossible to lay down a policy governing all cases where detours are needed.

I agree with Professor Petty in his editorial in the November issue of CONTRACTORS AND ENGINEERS MONTHLY that every reasonable effort should be made to provide a good detour. We do have some cases, however, where it would be necessary to spend as much money on the detour as on the road itself before we could say we had a satisfactory detour. We pay particular attention in our state to the adequate marking of detours so that there is little chance for traffic to get lost in following them. I have seen some states where traffic is left to fend for itself and detour marking is entirely inadequate. I do not believe that situation maintains here.

I am sure that if the traveling public would realize that detours are a sign of progress and if reasonable efforts are made for their comfort, they have no just criticism to make.

We do one other thing and that is get out detour maps three or four times a year showing roads that are under construction and roads that can be traveled and those that can not be traveled. I have not heard a great deal of complaint about our detours in this state.

I should estimate that the average cost of our detours would be something like $350.00 a mile.

Very truly yours,
T. H. Cutler,
State Highway Engineer
Frankfort, Kentucky
November 18, 1938

Voters Defeat Diversion In November Elections

Particularly significant to those interested in good highways was the action taken by voters in the November elections on the question of restricting, by constitutional amendment, the use of highway tax revenues to highway purposes, where that question appeared on the ballot.

The proposal for an anti-diversion constitutional amendment in New Hampshire was adopted by a vote of about 4 to 1. In Massachusetts a public policy question of instructing representatives to vote for a similar amendment was on the ballots in two districts, one of which answered "yes" by a vote of 3 to 1 and the other by a vote of 4 to 1. In both districts the "yes" vote was a majority of all votes cast in the election.

In California, the anti-diversion amendment was carried by a 130,000 majority and in Michigan, the amendment was carried in every county in the state, with an approximate majority of 200,000. Only in Alabama did the anti-diversion amendment fail to carry, the vote being 57,000 against and 54,000 for the amendment.

Montana voters approved Initiative Measure No. 41 which authorizes the issuance of $3,000,000 in bonds and continues the 5-cent gas tax. This in effect prevents diversion of highway revenues for the next ten years.

Help a Fellow!

You will give a fellow workman half your lunch if his is lost or full of ants. You will help him with his work if he was up half the night before on account of sickness in the family. You will take him home if his car breaks down. You will give him advice and sympathy in his troubles. But, if you see him performing a task in a clumsy or dangerous manner, do you show him the proper method? If he picks up a faulty tool, do you warn him? When you see him headed for a stumbling hazard, do you warn him, or do you say to yourself, "The darn fool will learn when he breaks his neck!"?

—H. P. Gray, Standard Oil Co. of California.

Arc-Welded Structure For Grade Separation

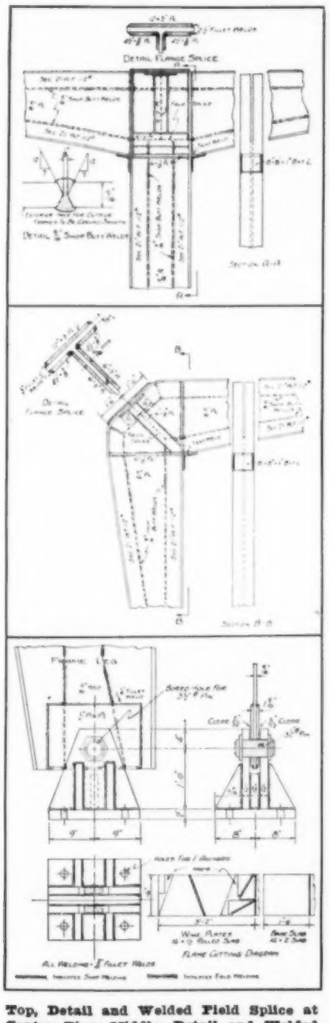
Abstract of Paper Placed Fourth Among Structural Entries in James F. Lincoln Foundation Competition

(*Photo on page 32*)

✦ A PAPER describing the proposed arc-welded two-span steel rigid-frame structure to carry Den Road, Stamford, Conn., over the Merritt Parkway about 8.1 miles east of the New York State line, prepared by Robert S. Treat and John F. Willis, Bridge Designer and Engineer of Bridge Design, respectively, of the Connecticut State Highway Department, was awarded the Fourth Main Award in the Structural Classification in the $200,000 Program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, to stimulate the wider use of arc welding.

Choice of Structural Type

The reasons for the selection of this type of structure are many, yet all converge toward the common group of objectives of safety, reasonable economy, speed in erection over a completed portion of the parkway, efficiency, appearance and adaptability to the existing conditions of the site. While realizing that economy must receive its full measure of consideration, a strictly utilitarian structure would be neither desirable nor admissable. Only a structure comparable to those now extant on this parkway and its neighbor the Hutchinson River Parkway would be tolerated.

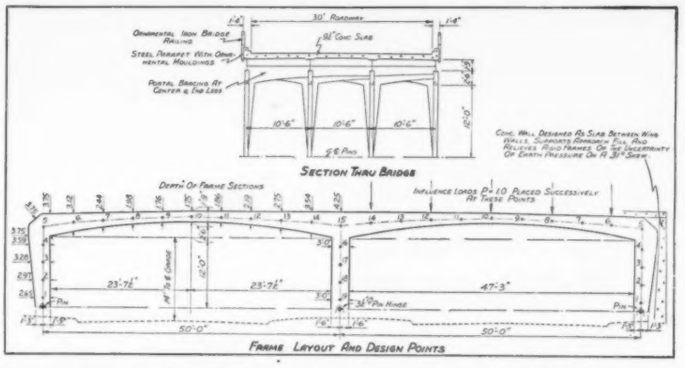


Top, Detail and Welded Field Splice at Center Pier; Middle, Detail and Welded Field Splice at Knee; Bottom, Detail of Built-Up Welded Shoe

Features of the Design

This paper was primarily intended to deal with the advantages offered by the welded type of structure over the usual riveted type. In the discussion the writers have given considerable study and frequent reference to the works of Muller-Breslau, Cross and Morgan and especially A. G. Hayden, whose valuable book "The Rigid Frame" suggested an ideal method of accumulating the moments and tabulating the results.

A complete design of this structure was made and all of the lengthy and somewhat laborious calculations are on file. This paper, however, includes only a skeleton of the design. The main dimensions of the frame, the span and height, are governed by the horizontal and vertical clearance requirements and were not arbitrarily assumed. The depths of section at all points were assumed according to the usual practice.



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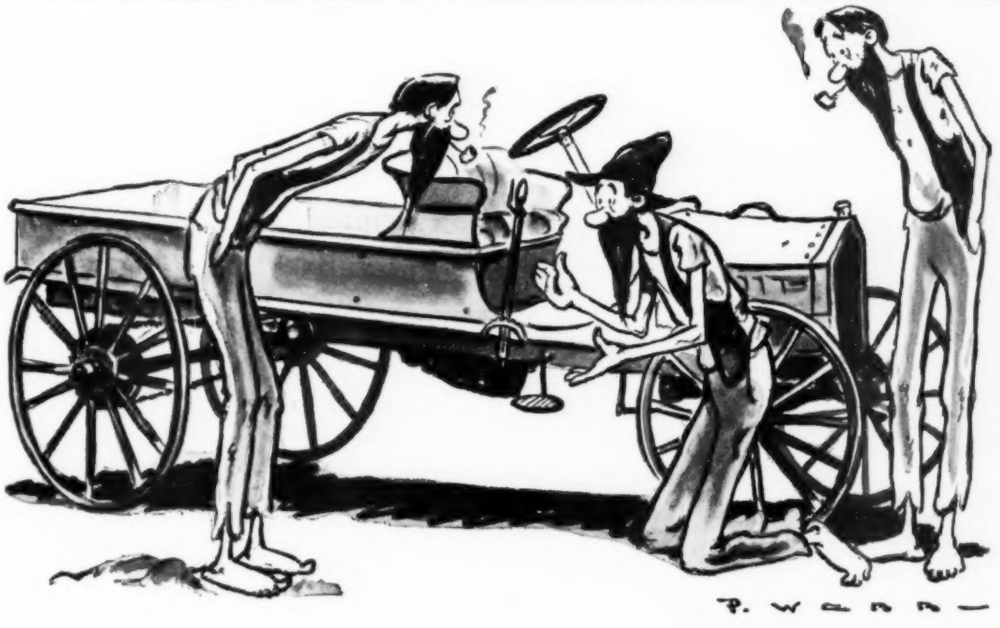

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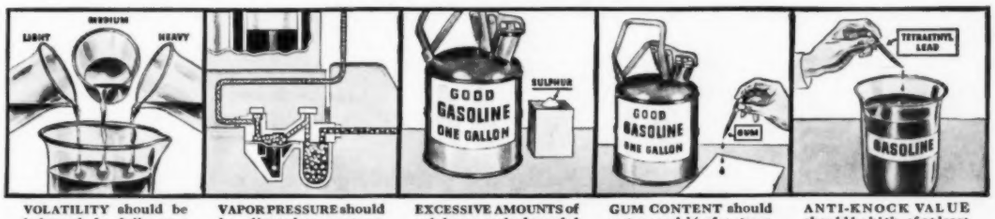

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THE BETTER THE GASOLINE THE BETTER THE PERFORMANCE

The Latest Model of the Galion Sand and Chip Spreader

New Chip Spreader

A new model of the Galion chip spreader, which can be furnished without an agitator, with a paddle fin type agitator to prevent packing and to break up lumps, or with a spiral agitator with right and left-hand sections to prevent packing, break up lumps and assist in the distribution of the material, has just been announced by the Galion Iron Works & Mfg. Co., Galion, Ohio.

This spreader, which is designed for distributing sand or chlorides on icy streets and highways as well as for handling sand and chips in road construction and maintenance, has a truck coupling on one side, adjustable for height to suit various trucks. Material is spread to a 10-foot width, the amount of material being determined by a quickly set feed valve and shut-off. Adjustments of the valve permit the maximum feed of material at one end of the spreader while the minimum or nothing is being fed at the other end. The spreader has two dual pneumatic-tired wheels, mounted an axles of extra heavy alloy steel, well supported in bronze bushed bearings located near the axle ends. The frame and hopper are fabricated from heavy-gage sheets and sturdy structural shapes, well-braced and arc-welded.

New literature on these Galion spreaders may be secured direct from the manufacturer.

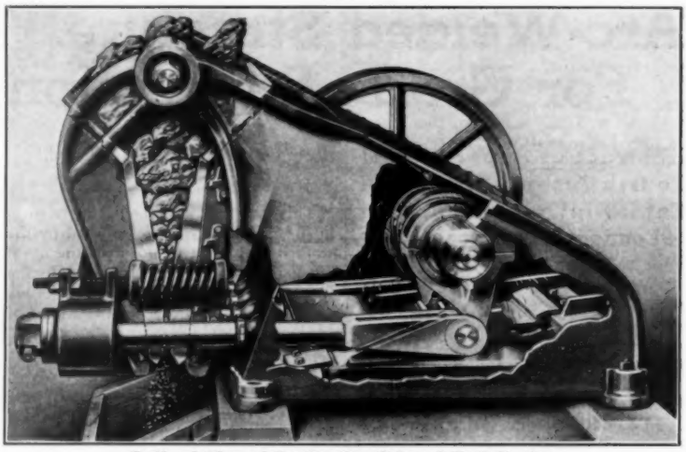
New Balanced Crusher Has Unusual Features

In business for 40 years, the Straub Mfg. Co., Inc., 507 Chestnut St., Oakland, Calif., has built several types of jaw crushers with one fixed and one moving jaw, and gyratory crushers. It has recently announced the Kue-Ken Balanced Crusher with two opposed jaws, both swinging freely like two pendulums and with practically no lifting effect on the rock being crushed. The wide open top is without obstruction and receives coarse or fine feed from any angle. The long, symmetrical steel jaws are of equal weight and are in balance so that they swing easily together with every part traveling in an arc of a circle, giving a downward force feed without abrasion on the faces of the jaws. The upper ends of the jaws travel through a shorter distance than the lower ends, insuring the maximum leverage on the largest rock and the longest jaw travel on the large volume of smaller material at the lower end, which is necessary for fast, economical crushing.

The long and similar jaw plates are designed for combined primary and reduction crushing, giving the correct angle of "nip". Smooth round rocks are gripped immediately without slipping and the jaw plates are easily removable or changed. Changing from one crusher product size to another can be done in less than three minutes, according to the manufacturer, and once set the adjustments are locked. The large alloy steel shaft which carries the jaws is precision ground and carries five big journals, one at the center for the inner jaw and two shorter ones for the outer jaw, and two additional journals to carry the strain-free shaft in the housing. An all-steel housing covers the entire mechanism with seals to prevent the entrance of grit or dust or the escape of lubricant. The lower part of the housing serves as an oil reservoir. A pressure gage gives constant visible indication of the oil condition within the housing where gallons of cooled filtered oil are poured over every part of the sealed mechanism.

Kue-Ken Balanced Crushers are available in standard sizes from the No. 10 machine receiving 10 x 5-inch rocks to a No. 150 machine capable of receiving 48 x 16-inch rock. Larger or special crushers are built to order. The No. 50 crusher weighs 11,000 pounds and has a feed opening 24 x 9 inches and operates at a speed of 365 rpm.

Bulletin 600 available from the manufacturer to those mentioning this item, or direct from CONTRACTORS AND ENGINEERS MONTHLY, gives tables showing tests of the No. 20 and No. 50 crushers using quartz as the medium to be crushed with various sizes of material, different settings of the jaws, and indicating the actual power used, the capacity of the crusher per hour, and the percentage of minus 8-mesh material in the crusher discharge.



Sectional View of the Kue-Ken Balanced Rock Crusher

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CAN BE SEEN A LONG, LONG WAY AT NIGHT!

The PRISMO PROCESS includes the introduction of thousands of microscopic glass spheres into special, semi-plastic paint. These tiny spheres of glass return light to its source so that a sign, marker or road stripe glows visibly and intensely. To the driver they appear luminous from every angle, greatly increasing the readability of directions.

They can be applied to any type of sign, flat or embossed, reflecting the color of the paint in which they are included.

PRISMO LIFE-LINE TRAFFIC STRIPING and WARNING SIGNS are clearly VISIBLE AT NIGHT, in fog and rain. In daytime they are distinct, effective. Each lane or marker appears floodlighted. Economical, brilliant, enduring.

PRISMO products have the acceptance and endorsement of engineers. They have been carefully developed, tested under the severest of conditions and meet every demand for increased effectiveness of all markings. Durable, trouble-proof, easy to apply.

Most practical, economical method yet devised by science to make road-markings more helpful. They cut down the accident ratio.

NOTE! Fiberglas fabric, easily applied, vandal-proof, for temporary markings has been perfected, embodying the PRISMO process. **Samples gladly sent** to anyone interested in reducing the accident rate and speeding up traffic in the modern manner.

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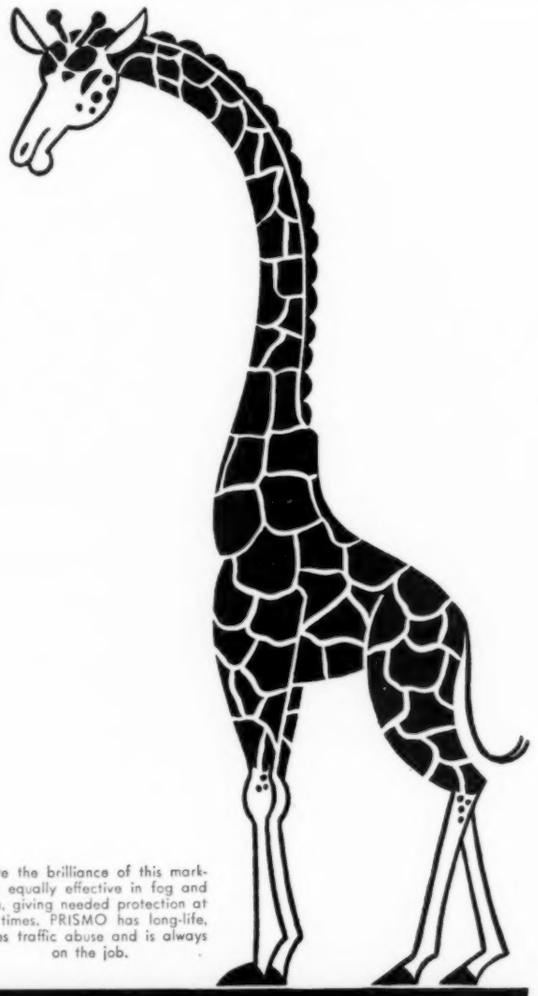
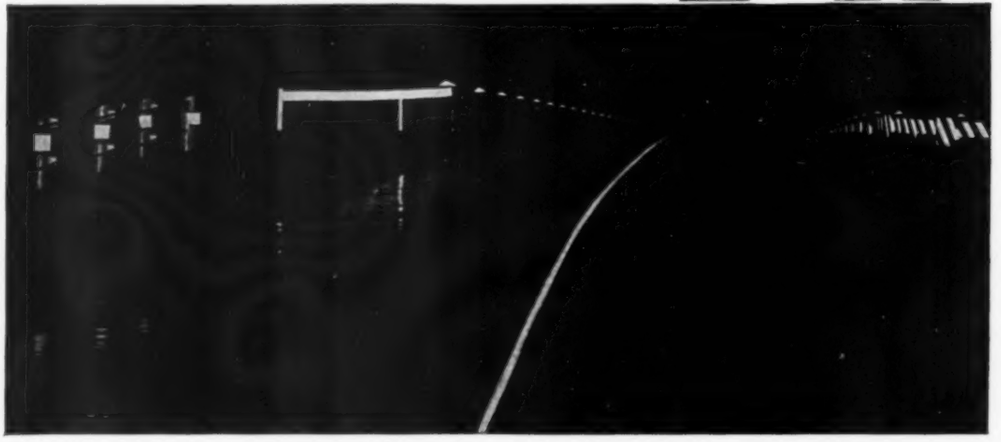
HUNTINGDON, PENNA.
DIVISION OF JOHN R. WALD COMPANY



Note the brilliance of this marking, equally effective in fog and rain, giving needed protection at all times. PRISMO has long-life, takes traffic abuse and is always on the job.



A Special Permit Was Necessary for This Monster of Modern Traffic to Travel the Highways in Michigan. This Is One of the Four 32-Ton Steel Bridge Girders Hauled on a Specially Lengthened Trailer from Detroit to Bay City

Huge Girders Hauled To Site on Trailer

Special permits from the Michigan State Highway Department, a police escort and a 35-ton pneumatic-tired trailer were involved in the delivery of four 32-ton bascule girders for the new Lafayette Bridge in Bay City, Mich., which proved to be one of the most unusual deliveries of construction material ever made in Michigan. The girders were each 76 feet long and 18 feet 3 inches wide.

The equipment used to haul these loads was a Federal truck equipped with a Cummins 150-hp diesel engine and a Rogers 35-ton trailer with vacuum booster brakes on the rear wheels and equipped with sixteen 7.50 x 15-inch pneumatic tires on the rear and four 1200 x 20-inch tires on the front. As these huge girders were carried on the trailer only, it was necessary to erect an 18-foot structural steel frame on the rear of the trailer to carry the girder level, and to lengthen the tongue of the trailer to 14 feet to get a perfect balance on the load for highway travel, as six short turns were made en route. When making these turns, it was necessary to have a man flag the corners and also to have a man on top of the girders to flag traffic.

Because of the size of these loads, it was necessary to secure a special permit from the State Highway Department, which was granted on the condition that the route outlined by them, avoiding the largest cities, would be followed and that the deliveries would be made when traffic was at a minimum. The girders were loaded at the R. C. Mahon Co. fabricating plant in Detroit and were accompanied by an escort of Detroit police to the city limits. At Bay City, local police met the hauling unit and escorted it to the site of the bridge. The trip totaled 128 miles one way so that the hauling unit traveled over 1,000 miles to deliver the four girders required for the bridge.

The P. Van Haaren & Sons Storage Co., Inc., of Bay City, which had the job of delivering these girders, has owned its Rogers trailer, used to transport these girders, for over two years, has had it in constant service and reports that it still has the original tires on it.

This low-bed heavy-duty trailer is one of a variety of similar models made by Rogers Bros. Corp., 108 Orchard St., Albion, Pa., which will be glad to send its literature describing these trailers to interested contractors and engineers upon request.

McLain of Thew Shovel Dies

A. L. McLain, Assistant to the Sales Manager of the Thew Shovel Co., Lorain, Ohio, died suddenly on October 23 in Cleveland, Ohio. Mr. McLain, who was a native of Texas, had been associated with the Thew organization for 10 years, eight of which were spent as Southwestern District Sales Manager at Dallas and the last two years as Assistant to the Sales Manager at Lorain.

New Trade Standards for Compressed Air Equipment

The fifth edition of its Trade Standards, published this autumn by the Compressed Air Institute, is more than double the size of the previous edition and includes such new material as sections on rotary compressors and vacuum pumps, centrifugal compressors and blowers, compressor accessories, rock drills and pneumatic tools; additional charts, tables and data; as well as an up-to-date revision of material previously published on reciprocating compressors and vacuum pumps, portable compressors, and a description of the method of testing displacement compressors, blowers and vacuum pumps conforming to the revised A.S.M.E. Code now under preparation.

Copies of the 112-page book, with wire binding, may be secured by interested contractors and engineers direct from the Compressed Air Institute, 90 West St., New York City. Price: $1.00, plus postage.

THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

Beebe Bros.
ALL STEEL HAND HOIST
SEATTLE, U.S.A.
COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"
Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" .....1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load. Price, f.o.b. Seattle

Gear Ratios	Weight	
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

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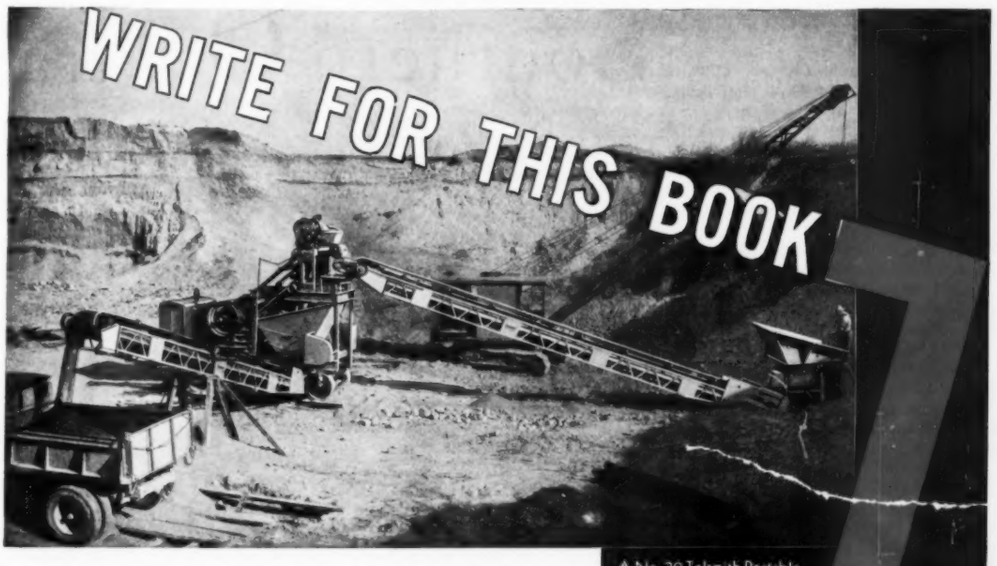

● **What are the two obvious trends in portable crushing operations today? The quickest and best way to settle this and many other important questions about portable crushing, screening and loading plants is to send for this new, illustrated 24-page Telsmith book. It tells you many things you want to know—**

Is the demand for 2-crusher and 3-crusher plants increasing? Which is superior . . . the "dual plant," with both crushers mounted on a single truck . . . or the "tandem plant" which is a coarse crusher, with separate truck and power plant, preceding a secondary crusher in closed circuit with elevator and screen? What are the advantages and disadvantages of each? Which is preferable—in crushing quarry rock—in the preparation of bank gravel? All these matters are fully discussed in Telsmith's new Portable book, Bulletin P-34—yours for the asking.

A No. 30 Telsmith Portable Crushing-Screening-Loading Plant operated by Huron County Road Commission, Bad Axe, Mich.

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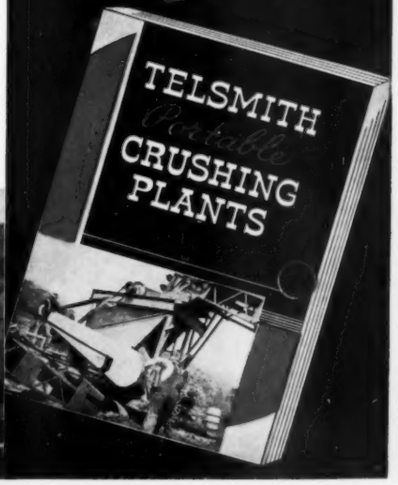

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PC-3-38

C. & E. M. Photo
The Ouachita Parish, La., Garage, Located at the Parish Airport Where the Major Portion of the County's Road Equipment Is Maintained

County Road Work In Ouachita Parish

(*Continued from page 1*)

and in trying to rescue him his neck was broken and he was left standing up in the swamp. During the recent work in which the road was widened considerably and drainage ditches were put in to protect the road foundation, the skeleton of the old mule was dug up. He was found standing just as he had been left and with a broken neck.

There are 592.45 miles of road in the parish maintained by the Road Department. These serve an area of 525 square miles on the two sides of the river. In 1936 there were 412.03 miles of parish roads of which only 70 miles were graveled. Ninety-five per cent of these roads were built by contract under various bond issues. The state has 180.42 miles of state and federal highways in the parish. Since 1936 the parish has added 109 miles of gravel roads and about 100 miles of dirt roads to its system. Ninety per cent of the 24-foot secondary dirt roads in the parish are maintained regularly.

The old 16-foot roads are being widened as rapidly as possible with the cooperation of the property owners, all of whom donate the added right-of-way so that the roads may be widened from 2 to 4 feet. On all new work the Road Department is demanding a 50 to 80-foot right-of-way. The soil in the parish consists partly of gumbo, a stiff clay with a high per cent of lime which is dusty in dry weather and very slippery in wet weather and holds the water for a long time before drying out.

The Road Program

The Parish has a road program consisting of 48 miles of graveling with WPA labor and parish equipment. On this work 10 yards of pit-run gravel is placed per station to stabilize the base and then 3 yards of washed gravel from the parish plant is placed for surfacing. The program calls for 3 miles of road per ward, or subdivision of the parish, per year so that in two years the gravel road mileage in the parish will be doubled. In addition, under the same program, from 2 to 4 miles of new road is being constructed in each ward per year.

There are ten wards in the parish, of which five are on the east side and five are on the west side of the river. Thirteen police jurymen are elected to administer the affairs of the parish.

The road work of the parish is financed by an ad valorem tax on real estate which brings in about $5,000 a month. The per cent of the state gas tax returned to the parish is used for construction while the entire ad valorem tax is used for maintenance.

The Airport

The parish has built the local airport named Selman Field. It comprises 160 acres, with surface and subsurface drainage added as a WPA project. It has two 100-foot wide runways 2,500 and 2,200 feet long black-topped through a joint project of the parish and the state.

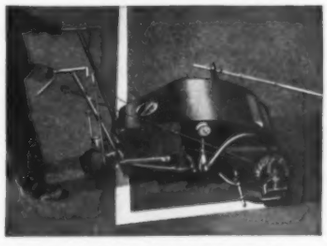
The Equipment Centers

Three maintenance units are operated by the parish from three centers. One center on the east side covers five wards on the east side and one on the west. There are two centers in the hill section on the west side of the river and each serves two wards.

At the east center located at the airport the parish maintains the major portion of its road equipment and shops. There are three No. 11 Auto Patrols, one with gas power, one tandem drive diesel and one single drive with dual tires, and one No. 9 Auto Patrol which has maintained over 60,000 miles of road for the parish and is still going strong. Also at the east center are five tractors, two Thirty-Five gas tractors, one RD4, one RD6 and a Seventy-Five diesel. For grading equipment there are three pulled graders as follows: one Caterpillar 33 with a 9-foot blade, one Caterpillar 66 with a 12-foot blade, and one Adams No. 8 grader with 9-foot blade. In addition there are a 3½-yard Bucyrus-Erie scraper and an Allen road maintainer with 12-foot runners which is pulled by a John Deere D1 fuel-oil tractor which is also used for pulling a Deere mowing

(*Continued on next page*)

M-B STREET MARKER



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TEXACO REG. T. M.

TEXACO *Crater Compound*

FOR GEARS, CHAINS, WIRE ROPE

Louisiana Parish Has Novel Gravel Plant

(*Continued from preceding page*)

machine.

Also working out of the east center is a Lorain 30 dragline with a ⅝-yard Page bucket with a 4-dual-wheel 15-ton trailer with mechanical brakes for moving the dragline to any part of the parish in quick time. There are three pick-up trucks, a Ford, a Chevrolet and an International; a 2-ton GMC covered unit with trailer and a 1½-ton Dodge flat-body truck for hauling prisoners; and a 2-ton Dodge and trailer for the bridge crew. In addition there are twelve hydraulic dump trucks, 6 Fords, 1 GMC, 3 Chevrolets, and 2 Internationals. There is also a Chevrolet ½-ton delivery truck for the Engineering Department and an International TD-40 diesel TracTracTor with an Adams terracer.

At the center for Wards 8 and 9 is the following equipment: one Fifty gas tractor; one Adams 22 with a 10-foot blade; a 60-cubic foot Atlas scraper and an International hydraulic dump truck. At the center for Wards 6 and 7 there are: a Fifty gas tractor; a Caterpillar 44 grader with 10-foot blade; a 70-cubic foot Atlas scraper; a 1½-ton International hydraulic dump truck; a Caterpillar grader pulled by an RD4 and having a 14-foot blade; and a ½-ton Ford pick-up truck.

A bridge crew working out of this last center covers all bridge work in the four wards. It consists of a leaderman and three laborers. A leaderman is used instead of a foreman and he receives from 50 cents to $1.00 a day more in wages than the men working with him. This crew has a 1½-ton Ford V-8 with a trailer.

At the center located at the Airport the parish maintains its own shop in a building 25 x 40 feet where blacksmith and paint work is done, and where all grader blades are ground. The garage for trucks and tractor repairs consists of a 60 x 90-foot one-story brick building. A Smith acetylene generator is used with Prestoweld tips for welding and cutting on repairs.

Each center has its own gasoline distributing system. At the east center are two 500-gallon gasoline tanks and there is one of the same size at each of the other centers. Diesel fuel is delivered in drums.

The Gravel Washing Plant

Prior to 1936 gravel was purchased by the parish from local commercial gravel plants. Since that time the parish has made a practice of buying deposits in various parts of the parish and then operating its own gravel washing plant. The Parish Engineer made a study of the local commercial plants before deciding on the type of plant to develop for the use of the parish. Practically all the commercial plants are of the dredging type which did not suit the more portable character that would be required of the parish plant.

The location of the gravel plant during 1938 and 1939 is about 6 miles west from Monroe. A dam was built with the material stripped from the pit to create a lake averaging 400 feet wide and ¼ mile long and 7 feet deep. It is spring fed and the wash water from the plant is not returned to the lake but run to another stream so that the new lake can be developed into a recreational center after the pit has been worked out and thus return the investment to the parish in another way. The dam for the lake was put in in two weeks, during which time heavy rains greatly increased the run-off and made it a bit difficult to keep up with the impounded water. An old boiler set on hard pan at one end of the dam was used as a spillway.

The pit of 40 acres was purchased for $750 and in the first two months of operation the parish took out enough gravel based on a price of 10 cents per yard, paid to owners of pits where pit-run gravel was removed before the parish operated its own pits, to pay for the entire pit. It is estimated that the pit contains 96,000 cubic yards of gravel as there are only about 15 acres of the tract that show gravel according to the test pits that have been dug.

At the edge of the artificial lake a pump house has been erected and two pumps mounted. One is an electric well pump which delivered insufficient water for the washing operation so an old 2-stage centrifugal was purchased and powered with a Thirty gas tractor that could not be used for other work. The 2-stage pump has a 6-inch suction and a 5-inch discharge which is piped separately from the well pump to the washing

(*Continued on page 26*)

C. & E. M. Photo

Like Koko, the Labor for Ouachita Parish's Gravel Plant Is "Taken from the County Jail". Above Are the Four Cell Blocks in the Prisoners' Stockade Which Includes a Guard House, Dining Room, Kitchen and Hospital, Located at the Airport.

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Bulldozing Railroad Fill into Place on a Recently Completed Contract of the Isabell Construction Co., Reno, Nev.

Railroad Fill Job Speedily Completed

The unusual use of the versatile bulldozer on a contract for replacing a rotted railroad trestle with a fill 60 feet high and containing 32,000 cubic yards resulted in the completion of the job with dispatch. The Isabell Construction Co., of Reno, Nevada, was awarded the contract for this work.

Departing from the conventional method of using bottom-dump railroad cars to bring in the fill, the construction engineer was able to locate a satisfactory borrow pit nearby. Three LeTourneau Carryalls with Caterpillar D8 tractors dug and hauled the material from the pit and it was placed by a LeTourneau bulldozer mounted on a D8. With this equipment, the job was speedily completed in fifteen 8-hour days.

New Welder Models

Two new 150-ampere arc welders, one for direct current and the other for alternating current, have recently been announced by the General Electric Co., Schenectady, N. Y. The a-c model, which is of the transformer type, is for low-current welding with heavily coated a-c electrodes. While intended chiefly for light-gage work, its wide range of 35 to 180 amperes permits its use on fairly heavy materials as well. It has woven spun-glass fireproof insulation to prevent damage from heat on heavy overloads. Solidly brazed internal connections eliminate the possibility of open circuits and continuous stepless current control is obtainable by means of a hand crank. A choice of two open-circuit voltages, 80 and 100, is provided to handle all types of a-c electrodes. Easy portability is provided by casters or by means of a hoist sling over the hand crank.

The d-c model, also intended for light-gage work, has a high quick recovery of voltage to prevent arc pop-outs at all points in its welding range with any good bare, lightly coated or heavily coated electrode. Any welding current within its range can be quickly obtained by means of a three-point selector switch and an easily operated dial for intermediate adjustment. Isothermic overload protection permits the equipment to carry maximum safe overloads without danger of burnouts and without unnecessary interruptions on harmless overloads.

A New Large-Capacity Portable Compressor

A new compressor delivering 425 cubic feet of air a minute at 100 pounds and available in portable or semi-portable mountings has recently been issued by the Ingersoll-Rand Co., 11 Broadway, New York City. Known as the Model 425, this is a self-contained compressor plant, consisting of a slow-speed heavy-duty stationary-type compressor driven by a four-cylinder heavy-duty tractor-type engine through simple reduction gears. Either gasoline, gas or oil engines can be furnished.

Copies of descriptive bulletin 2486 giving full details on this new compressor may be secured direct from the manufacturer by mentioning this magazine.

Tests of Water-Measuring System for Truck Mixers

The results of tests conducted by an engineer of the Indiana State Highway Department on the water-measuring system used in Blaw-Knox Trukmixers are discussed in a new bulletin recently issued by the Blaw-Knox Co., Pittsburgh, Pa. The tests were made under different gage settings and with the tank in level and variously tilted positions.

Copies of this Bulletin No. 1643, which also contains a graphic explanation of the method of water flow and control in Trukmixers, may be secured by interested contractors and engineers direct from the Blaw-Knox Co.

A Plea for Safer Highways

This is the title of a new bulletin, recently issued by the Armco Culvert Manufacturers Association, Middletown, Ohio, on the use of Armco Multi Plate culvert to replace small unsafe bridges. There are in existence today many such structures, built years ago, which are no longer strong enough or wide enough to carry modern traffic. Armco Multi Plate is available in full-round or arch designs and ranges in thickness up to more than ¼-inch, the individual plates being further strengthened by extra large corrugations.

Copies of this bulletin may be secured by state and county highway engineers direct from Armco.

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Labor Relations In Construction

The Problem Is One of Economics Rather Than Wages and Shorter Hours, According to A. G. C. Head

✦ WHAT is the picture of organized labor in the construction industry in the United States? Edward P. Palmer, President of the Associated General Contractors of America, painted an effective word picture at a recent meeting of the Metropolitan Section, Am. Soc. C. E.

"Organized labor," said Mr. Palmer, "includes only a small proportion of those engaged in gainful occupations in the United States. The A. F. of L. has a total membership of over three and one-half millions and the C. I. O. has a membership admittedly less stable which is estimated anywhere between two and four millions. Probably seven millions total is as close a figure as is available."

Labor Relations Defined

The term "labor relations" as used in this country refers to the relations between employers and organized labor. In all large cities and in many of the smaller ones practically all of the unions engaged in building construction are affiliated with the A. F. of L. Until recently, for the most part, highway and so-called heavy and railroad construction has been done by unorganized labor. More recently both the A. F. of L. and the C. I. O. have made efforts to organize these two fields. Success by the latter has been almost entirely confined to rock tunneling and that largely in the western states.

Even though it represents only a small proportion of all labor, it may be said that organized labor definitely qualifies as "Big Business." For example, the Building and Construction Trades Department of the Federation, comprising nineteen international unions with a total membership of about 750,000, has an annual budget of about $36,000,000, not including strike and other benefit monies. If all organized labor is similarly assessed, it appears that the annual budget of all organizations must reach $350,000,000.

Jurisdictional Disputes

Mr. Palmer pointed out that jurisdictional disputes among unions affiliated with the A. F. of L. for years plagued the building industry and appeared to be on the increase and further called attention to the possibility that if the C. I. O. becomes more active in the construction field, a new flood of such disputes may be expected.

"This is labor's problem," he said. "Neither the employer, the owner, nor the Government can settle a problem so essentially internal. Until organized labor proves that it has the capacity to settle such fundamental questions, it comes with poor grace before the court of public opinion asking for more authority in the conduct of industry."

In the building trades in New York City, there are thirty-one major crafts and sixteen helpers' unions, each of which requires a separate agreement, none of which run beyond one year's duration. The making of forty-seven or more agreements in each twelve months puts a severe strain on labor relations and tends to prolong an unsettled condition in building construction in that district. The Building Trades Employers Association of New York City (the bargaining agent for the builders), recognizing this, is urging a blanket agreement similar to that in force during the 1920's. This plan, revived in 1933, was abandoned in 1934 because of disagreements between labor's representatives. The emergence of the six and seven-hour work day for certain crafts was cited as a result of the policy of negotiating separate agreements.

Labor in Heavy Construction

Depending on the section of the country, members of the A. G. C. in the fields of highway and heavy construction are running both closed and open shops. In view of the pressure by Government to induce contractors to unionize, progress in these fields has not been as great as might be expected. Mr. Palmer said that in a recent tour visiting A. G. C. Chapters throughout the country, he had tried to obtain a concensus of reasons for this condition which he gave as follows:

First, in the northern sections where, especially in highway construction, the working season is short, there was a fear that jurisdictional disputes would further reduce this working time.

Second, there was a fear that unionization will raise costs so as to reduce the extent of construction to the point where taxpayers will rebel.

Third, they fear that the labor leadership is not yet strong enough to enforce agreements and that stoppages of work over petty considerations and sympathetic strikes will further reduce their working time and increase their costs.

Fourth, there is a great deal of uncertainty as to the part Government will play in labor relations through the National Labor Relations Board, especially if C. I. O. enters this field in opposition to the A. F. of L.

Territorial Jurisdictions

It was pointed out that local building trades councils of the A. F. of L. which were extending their activities to cover highway and heavy construction had been originally organized to cover a definite geographic area. A typical highway contract might readily cross the jurisdictional boundaries of two or more building trades councils, adding another possible dispute. Mr. Palmer suggested that if the A. F. of L. and its affiliated unions would consent to agreements covering wider geographic areas, this source of conflict would be eliminated.

Question of Increased Costs

Many public officials and their engineers look upon the contractor merely as a middleman who figures the rate of wages into his bid and thus automatical-

(Continued on page 20)

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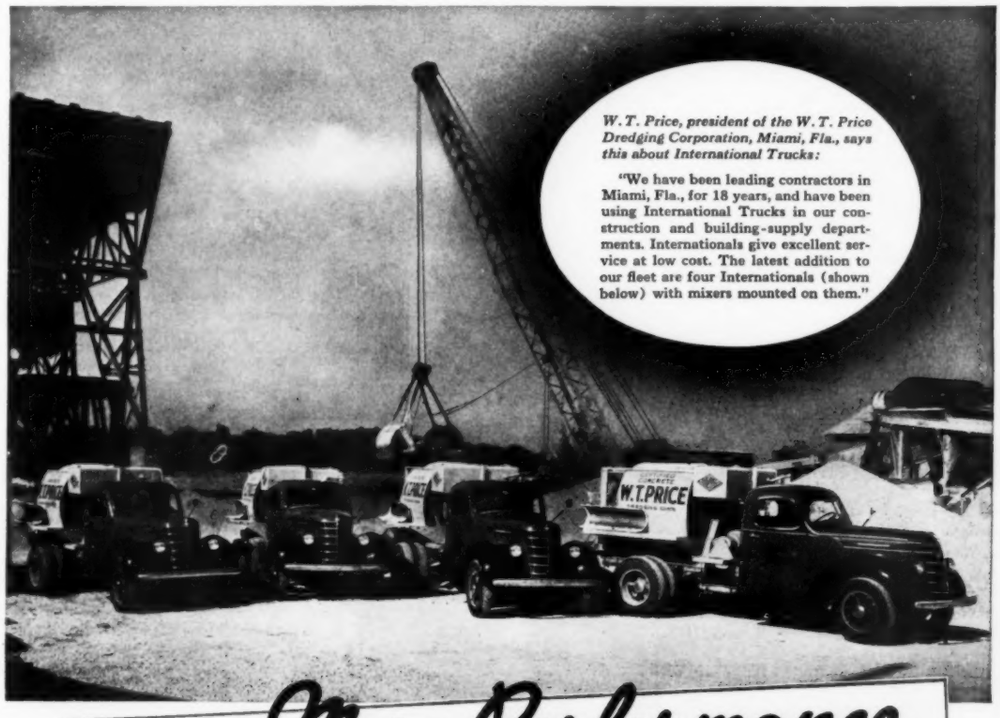
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INTERNATIONAL TRUCKS

Drainage Structures Complicate Grading

(*Continued from page 1*)

river at this point. The road follows the old road for the first mile and then for the balance of its length is mostly on new location as it was aimed to eliminate the great number of bad curves in the old line.

For the entire length of the two contracts, the rock excavation was 382,000 cubic yards while the earth excavation was only 157,000 cubic yards. This made necessary a considerable amount of rock drilling equipment. The contractor chose to start the work at one point and continue from one cut to the next instead of loading the job with a large amount of equipment which would have made it possible to work more than one cut at a time. The contract required that the grading for Project 9800, which was started in February 1937, must be completed so that the route could be opened to traffic by May 15 of that year. In the 20,000 feet affected by this requirement the contractor removed 115,000 cubic yards of excavation, mostly rock, to open the road in time. He used a Schramm portable compressor, a Gardner-Denver wagon drill and four Gardner-Denver jackhammers. The holes were drilled a maximum depth of 22 feet with the wagon drill and shot with Austin Red Diamond 60 per cent dynamite. The rock was a solid granite which broke well and was removed with a Northwest 2-yard diesel shovel which handled all the excavation on the contracts. It loaded to five Euclid crawler wagons pulled by RD5 and RD7 tractors. The average haul was only 500 feet with a free haul distance of 1,000 feet. The overhaul was very small, considering the yardage handled. This was due to the large fills required close to every large cut.

Heavy Cuts and Fills

There were several cuts 50 and 60 feet deep and the maximum through cut was 92 feet deep on the high side. The deep cuts were worked in 15-foot lifts and at Station 322 the contractor used two switchbacks, one from the top of the cut to get the wagons down and then another to the toe of the fill which was a total of 47,000 cubic yards.

The slopes in the cuts varied from ¼ to 1 to about 1½ to 1 but were mostly ¾ to 1. The cuts were all rounded at the top on a 4-foot vertical curve and berm ditches were run not closer than 5 feet to the top of the slope.

The through fills ran from 60 feet on the center line to as deep at 100 feet at the toe. At least three of the fills contained over 30,000 cubic yards each. They were all spread in 6-inch layers with bulldozers and then compacted with sheepsfoot rollers. All slopes exposed to stream erosion were riprapped with 50 to 250-pound stone. The small branches running across this work are flashy.

Wherever pipe clay was encountered in the cuts the material was removed to a depth of 3 feet and the section backfilled with stable material.

Drainage Structures

The drainage problems on this work were numerous and complex. Of the more simple problems was the prevention of shoulder wash. This was taken care of by the standard stone shoulder drains used throughout the state. They consist of trenches 8 inches deep and 1 foot wide filled with 1½-inch stone and running from the paved road to the slope. The stone is carried 2 inches above the shoulder dirt to prevent earth washing into the drain.

Three types of ditch drains were used, the L-type, and drop inlets with straight and L-shape headwalls. These were all built of field stone, thus saving in the cost of concrete for such numerous and small structures. For drainage of the water under the road from the inlets 30-inch corrugated pipe was used as the maximum size and above that concrete culverts were built.

There was approximately 2,000 feet of paved shoulder gutter 5½ feet wide of flat rubble laid with open joints. Mortar was used only at sections where the maximum scour might be expected near drop inlets.

One culvert on a sidehill fill was 212 and another 208 feet long.

Removing Ground Water

On one large cut that ran 60 feet deep the water table was 12 feet above the subgrade of the roadway and the water drained from the face of the cut down to the roadway drainage ditch. There were also considerable signs of water in the subgrade. Lateral French drains 2 feet deep and 1 foot wide were dug across the road and filled with coarse stone. These were spaced about 25 feet apart in the cut and ran to 6-inch tile drains 30 inches below the subgrade on the low side of the road. The tile was covered with 1 foot of coarse stone and then dirt. The ground water draining from the face of the cut was carried by the dirt of this drain. Another method that might have been used was the paving of the top of the surface drain to prevent constant erosion of the dirt over

(*Continued on page 23*)

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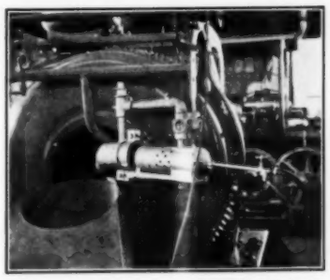

One of the Defenses Against the Effects of Cold Weather on Concrete—a Littleford Concrete Heater

Heating Equipment To Keep Work Going

Bridge and culvert contractors, road contractors, operators of gravel plants and state and county highway departments all find a need for various types of heating equipment in order to keep the work going during the winter months. Such equipment includes heaters for concrete mixers, thawing torches, salamanders and surface heaters.

There is no need to shut down all operations during the winter, but it is necessary that a winter job have the proper equipment. This is particularly important on concrete jobs, for heat is essential for the proper curing of concrete. If it is frozen at the time it is placed or shortly thereafter, it will never cure properly and will soon begin to chip and crack. Contractors carrying on concreting operations during cold weather should have a heater for their concrete mixers, plenty of tarpaulin to protect the concrete after it is poured and some type of heater or provision for keeping the concrete at a temperature of 50 degrees or higher for at least 72 hours after placing.

A compact and very useful table outlining the necessary protection for concreting during the varying winter temperatures has been compiled by Littleford Bros., 435 E. Pearl St., Cincinnati, Ohio. Divided into three general sections, cool weather above 40 degrees, cold weather between 40 and 20 degrees, and cold weather below 20 degrees, this chart covers the various kinds of concrete work, such as foundations, piers, retaining walls and other mass concrete; roads, streets, sidewalks and similar work; and thin sections such as beams, columns and other exposed work.

Copies of this valuable chart, as well as literature describing the line of Littleford heating equipment for use on winter construction, may be secured without obligation from Littleford Bros.

New Vibrator Model For Stiff Concrete

The new C-P Shimmy Spade No. 219, recently announced by the Chicago Pneumatic Tool Co., 6 East 44th St., New York City, is a pneumatic vibrator for concrete above a 3-inch slump such as is used in concrete columns, piles, thin walls, and floor and roof slabs. It is 2½ inches in diameter, light in weight, and can also be attached to the outside of pipe and other pre-cast product molds or forms.

The unit is powered by a sturdy Power Vane rotary air motor with low air consumption and few moving parts, providing 9,000 vpm. The vibrating tube is 19 inches long and standard equipment includes 5 feet of exhaust hose, 15 feet of auxiliary hose for operation in deep forms, a line oiler, a line strainer and twist throttle which can be located at the end of the exhaust hose or the auxiliary hose, 20 feet from the tube, to suit placing conditions.

Complete specifications on the Shimmy Spade No. 219 are contained in a new bulletin, copies of which the manufacturer will be glad to send to those interested upon request.

Small Diesel Tractors Described in New Booklet

The operating costs and specifications of the 25-hp Caterpillar D2 tractor are given in a new 32-page booklet recently published by the Caterpillar Tractor Co., Peoria, Ill. The features of the tractor's diesel engine, transmission and track construction are clearly shown by the use of photographs and are explained in the text.

Copies of this well-illustrated booklet Form 4757 may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

New Welding Bulletin

Procedures for producing all types of welds in mild steel, for welding all metals used to any extent industrially, and for applying surfacing metal to meet any type of wear action in service are given in a new bulletin just announced by the Lincoln Electric Co., Cleveland, Ohio.

This new 36-page bulletin covers flat, vertical or overhead welding of mild steel; single or multiple pass welding and for poor fit-up in mild steel; flat welding of fillet welds in mild steel; flat welding of deep-groove joints in mild steel; flat welding of deep-groove joints in high tensile steels; general welding of high tensile steels; welding of light-gage steel, 18-8 and 25-12 stainless steel, 4-6 chrome steels, high manganese steel, cast iron, aluminum, bronze, brass and copper; for surfacing to produce moderate shock and abrasion-resisting welds; rolling or sliding abrasion-resisting welds; and for making tool steel cutting edges on ordinary steel and rebuilding worn tools and discs.

Copies of this Bulletin 401-A may be secured direct from the Lincoln Electric Co. or from this magazine.

RAIL CRANES SHOVELS DRAGLINES ZEE ROTATORS
BROWNING PRODUCTS
DIESEL GASOLINE STEAM ELECTRIC

BROWNING
has had no peer for 40 years
AT YOUR SERVICE FOR THESE PRODUCTS
THE BROWNING CRANE & SHOVEL CO.
Established 1899
Main Office and Factory 18226 Waterloo Rd., Cleveland, Ohio
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CRAWLER, TRUCK AND WAGON DRAGLINES SHOVELS CRANES - HOES
BROWNING PRODUCTS
DIESEL GASOLINE STEAM ELECTRIC

On a basis of ultimate cost· You'll choose GILMORE WIRE ROPE

In buying Wire Rope you pay only for service—nothing else. We have already recorded instances of service unlike anything heretofore accomplished with Wire Rope—all largely due to precision manufacture. When you buy Gilmore Wire Rope you may expect unusual service and when you get that—your rope cost has been materially reduced. Let us prove it.

Other J & L Steel Products: Jaltruss Bridge Floor Reinforcement Sections—Bar mill products, including Bars for Concrete Reinforcement—Bar size shapes—Hot Rolled Plates and Structural Shapes — Junior Beams — Lightweight Channels —Standard Pipe in seamless and welded—Wire Nails and Spikes —Tie Wire—Galvanized Steel Roofing and Siding.

J&L STEEL

GILMORE WIRE ROPE DIVISION
MUNCY · PENNSYLVANIA

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH · PENNSYLVANIA

A Hot-Mix Surface On Tar-Primed Base

Central Paving Company Laid 8.76 Miles North of Columbus, Miss.; Averaged 1,300 Feet in Daily Runs

✦ USING a well-planned hot-mix plant located in a local gravel pit and an asphalt finishing machine, the Central Paving Co. of St. Louis, Mo., laid down 1,300 feet of binder and top course each 12 hours of 2-shift operation on the road and 11 hours of plant production. This PWS No. 196C-Lowndes County job was 20 feet wide, 8.76 miles long and located on U.S. 45 running north from Columbus, Miss. The assembled plant was located in the gravel pit of Waters & McCrary Gravel Co., requiring 2.7 miles dead haul and 4.3 miles average haul on the road.

The Hot-Mix Plant

The producer of the gravel stockpiled the screened and washed gravel as well as the sand adjacent to the plant and a Speedcrane with a 50-foot boom and a 1-yard Kiesler clamshell loaded it to the four Butler feeding bins. Reciprocating feeders beneath the four bins moved the material into the boots of two cold elevators, one for each drier. The two Pacific-type driers, 20 feet long by 46 inches in diameter, were heated with two fuel-oil burners each. The two driers delivered the hot material to one hot-material elevator which carried it to the 4-deck vibrating screen furnished by John Deister, Fort Wayne, Ind. The screened material was delivered to four bins and to an oversize chute to waste. The four bins contained: sand; gravel passing ¼-inch and retained on a ⅛-inch screen; gravel passing ¾-inch and retained on a ¼-inch screen; and passing 1½-inch and retained on a ¾-inch screen.

From the four bins the weighman drew the required material and measured the weights with a Fairbanks 10,000-pound dial scale.

Material	Pounds in Batch Top	Binder
Coarse sand	3,078	1,800
Fine sand	2,052	1,200
Gravel	3,470	6,500
Asphalt	700	500
Limestone dust	700	0
Total Batch	10,000	10,000

The mixing was done in a 6-foot rotary pressure mixer in which a header bar, equipped with five ⅜-inch nozzles fed through a pipe line in the drum trunnion, ran the full width of the drum.

The asphalt was received from Lion Oil Refining Co., El Dorado, Ark., in insulated tank cars and pumped direct from the heated car to a pressure tank where it was weighed on a Fairbanks dial scale and forced by super-heated steam pressure through steam-jacketed flexible tubing, the header bar and spray nozzles into the mixer. The contractor kept five tank cars on the siding at the plant at all times against any failure of delivery by the producer. As soon as a car was empty another was ordered. An 80-penetration asphalt was used, heated to around 250 degrees F. so that with the heated materials from the drier the temperature of the batch would be within the specified limits of 250 to 350 degrees. The contractor maintained the temperature between 250 and 275 for easy handling.

An exhauster on the driers removed the moisture and gases from the materials as they were heated. The fan, a larger unit than was really required, pulled so much of the finest material during its first two weeks of operation that the casing was cut through. This did no harm as the exhaust blew in the general direction of some woods.

A separate dust elevator was used for the limestone dust loaded in a small dust shed at the side of the plant.

The labor organization at the plant was as follows: One crane man; two feeder men for the cold elevators; one dust man on the weighing platform; one regular weighman; one helper using the I-R air hoist for the lid for the mixer drum and who also helped fasten the lid with four heavy clamps when charged; one drier fireman; one mixer operator; one boiler fireman per shift, (there were four boiler fireman in all, working 6-hour shifts round the clock);

C. & E. M. Photo

A Speedcrane and Kiesler 1-Yard Clamshell Bucket Loading Aggregate at the Hot-Mix Plant

(*Continued on page 27*)

Quality of workmanship, design accessibility, speed, working range and safe load capacity are built-in features that assure BAY CITY owners more yardage at lower cost. For economical, efficient operation investigate BAY CITY Machines.

Write for details

BAY CITY SHOVELS, INC.
Cable address "DREDGE"
BAY CITY, MICH.

Users of JACKBITS *know* that the design of the thread insures longer life and greatly improved performance. This patented thread keeps the bit tight without interfering with the ease of detachment and permits the bit to be easily put on or removed. Jackbits are always tight even after much use because the thread design automatically compensates for wear.

The strength of the Jackrod is maintained from top to bottom. There are no deep undercuts to cause failure. Because of the solid, broad seat between the Jackrod and Jackbit, the piston blow is transmitted squarely to the cutting edge through the full area of the rod. None of the blow is transmitted through the threads.

The threads on Jackrods can be easily forged in an Ingersoll-Rand Sharpener, or turned with either a power threading machine, a lathe or a hand threading tool.

Other Ingersoll-Rand Products Include: Rock Drills, Drill Steel Sharpeners, Portable and Stationary Compressors, Vacuum Pumps, Diesel Engines, Pumps, Scraper Hoists, Pneumatic Tools, etc.

Atlanta, Birmingham, Boston, Buffalo, Butte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Duluth, El Paso, Hartford, Houston, Kansas City, Knoxville, Los Angeles, Newark, New York, Philadelphia, Picher, Pittsburgh, Pottsville, Salt Lake City, San Francisco, Scranton, Seattle, St. Louis, Tulsa, Washington

Ingersoll-Rand

11 BROADWAY, NEW YORK CITY

Bearing Lubrication

The importance of proper lubrication can not be stressed too frequently or too emphatically. One phase of the lubrication problem is that of ball and roller-bearing lubrication. Most bearing manufacturers include instructions for properly lubricating their bearings, which instructions are often disregarded, both as to the frequency of lubrication and the type and quality of lubricants to be used.

In an interesting well-illustrated 42-page booklet "Ball and Roller Bearing Lubrication," The Texas Co. has gathered together a great deal of valuable information on this important subject, including a discussion of bearing constructional features, the lubrication of anti-friction bearings, types of lubricants, protection of lubrication, the application of lubricants, lubrication charts and Texaco lubrication recommendations.

Copies of this booklet may be secured by interested contractors and state and county highway engineers direct from The Texas Co., 135 E. 42nd St., New York City, by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

Protective Equipment For Accident Prevention

To aid in solving industry's problems of accident prevention, the American Optical Co., Southbridge, Mass., with more than a hundred years of experience in conserving and protecting eyesight, has announced a new and complete line of protective clothing, gloves, sleevelets, leggings, aprons, hats and hoods, in addition to its line of eye-protection goggles. These products are available in a variety of materials to protect workmen against heat, fire, acids, cuts, abrasions, etc. Special items of protection to meet unusual requirements can be made to order.

A new catalog, describing in detail this complete line of protective clothing and listing the company's more than 200 branches located in principal industrial centers, may be secured by interested contractors and engineers direct from the American Optical Co. by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

Get under winter's skin

. . . WITH "CATERPILLAR" DIESELS!

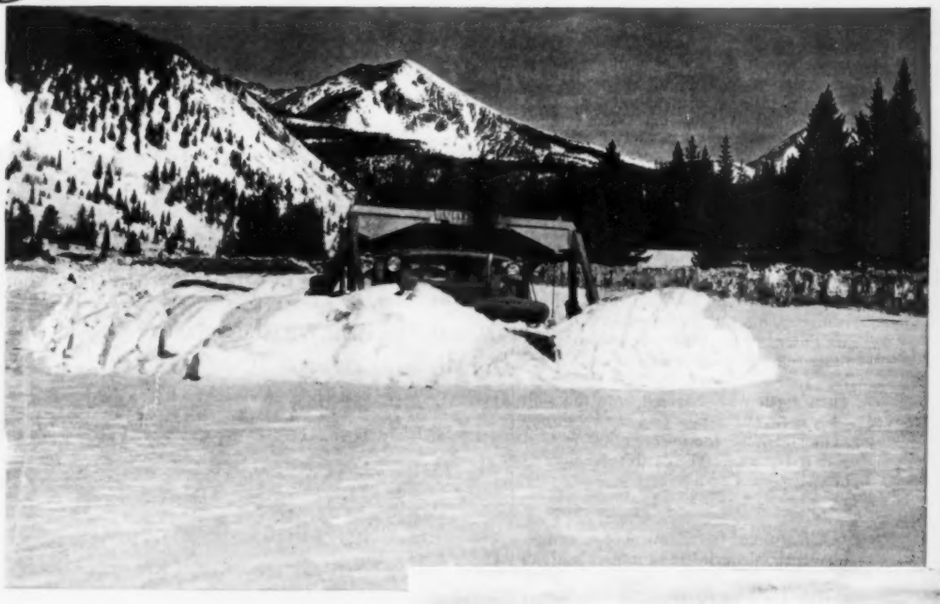
NO MATTER how thick the Winter's skin gets, you can peel it back and toss it aside . . . quickly, efficiently and economically . . . with "Caterpillar" Diesels!

Here, in the "Caterpillar" Diesel line, is the *right* equipment for *any* snow. Do you have to battle big, wet drifts—piled deeper than a man is high? For a snow like that, or one even worse, you usually need the heavy pushing-power of a "Caterpillar" Diesel Tractor.

On the other hand, less severe snowfalls can be speedily and cheaply removed with a "Caterpillar" Diesel Auto Patrol!

Choose your equipment according to your needs. But make your choice from "Caterpillar" Diesels. Depend on their sparing use of low-cost fuel . . . moderate maintenance costs . . . ample traction . . . tremendous power . . . to make this one of the easiest Winters you ever went through!

And, when Spring comes, you can put them to restoring the roads . . . repairing shoulders and ditches . . . scarifying, blading, grading . . . building roads where roads have never been before . . . *at a lower cost-per-mile than you ever paid before!*



Six feet of snow giving way before a "Caterpillar" Diesel D8 Tractor with a LaPlant-Choate snow-plow. This outfit opens up 12 miles a day on only 3⅗ gallons of 11-cent fuel an hour. And it's working in Rocky Mountain snow!

A "Caterpillar" Diesel No. 11 Auto Patrol opening up 30 miles of road in a 10-hour day . . . on less than 2 gallons of low-cost fuel an hour! The temperature is 40° below zero, here. But the "Caterpillar" Diesel, with its small built-in gasoline engine, starts surely —and without hard work on your part—in temperatures even lower!

A NEW-TYPE MOTOR-GRADER!

THE NEW, HEAVIER "CATERPILLAR" DIESEL No. 12 AUTO PATROL

Here is a machine that hasn't yet had a real chance to show what it can do on heavy snows. It was first offered for sale only a few months ago. But it quickly proved itself as a roadbuilder and maintainer! And with its greater weight, increased traction, and wider blade-scope it will establish itself just as firmly as a snow-remover!

Powered by a 66-horsepower "Caterpillar" Diesel Engine, this new Auto Patrol has six forward speeds. It is suited for heavy ditch cuts, high-bank cuts and all types of construction and maintenance work. Its blade is fully revolving and capable of an almost unlimited range of positions. Power controls may be operated at two speeds. Steering is easier and more accurate than with any other motor-grader! See your nearest "Caterpillar" dealer.

CATERPILLAR TRACTOR CO. PEORIA, ILL.

REG. U.S. PAT. OFF.

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

Four-Lane Highway Built in Georgia

(*Continued from page 2*)

inch of the top of the slab and tie bars of ½-inch round deformed steel 3 feet long were threaded through the center steel at 2-foot 6-inch intervals. The expansion joints were spaced every 90 feet and had ¾-inch headers of steel which were removed by the finishers and the joints poured later. Contraction joints were placed at 30-foot intervals between the expansion joints. The contractor used Translode expansion and contraction joints on this contract. The concrete pavement was not reinforced except at approach slabs to bridges and culverts.

Finishing and Curing

Two puddlers were used behind the paver and ahead of the Blaw-Knox Ord double-screed finishing machine. Right behind the finishing machine two men with a 10-foot longitudinal float smoothed off the concrete and removed any excess water from the surface. Then two straight-edge men handled the pair of 10-foot straight-edges with which they both dragged and checked the fresh concrete. They also pulled a 10-inch rubberized canvas belt leaving a herringbone finish on the road. Completing the finishing were two men edging the joints and sides and four men on lip curb.

On curing two men spread the burlap which was kept wet on the rolling bridge. This was left on the slab until 10 the next morning when it was removed and the slab given a final checking for acceptance by the inspector. Then earth was shoveled onto the slab by a crew of ten men and wet, with one man and hose for every 1,000 feet of slab to be cured. The earth was removed after a period of ten days.

Special Drainage Construction

A feature of the drainage of this highway is the drop inlets at intervals along the outer edge of the pavement adjacent to the lip curbs. They are 15 inches wide and 6 feet long with three 2-foot sections of gratings with bars spaced ¾ inch apart and 2½ inches deep. These open into small catch basins with 10-inch corrugated iron pipe leading to the ditch. The plans called for a 10-inch wall on the outside of the inlet spillway and 4 inches on the ends and inside. The contractor was given the option of pouring these ahead of paving or of pouring them as the paver reached each inlet. As there were 78 of these on the 1.9 miles of the job the contractor gave some thought to the better method of handling them.

Each drop inlet had to have a form and the outlet pipe in place before the paver arrived if it was to be poured by the paver. This might cause some delay at the paver if they were not assembled in time. On the other hand the spotting of stockpiles of stone, sand and cement along the right-of-way for 78 small concrete jobs did not appeal to the contractor. As there was no ready-mixed concrete plant within a reasonable distance of the job the contractor chose to pour the inlets as the paver reached them. There was only one delay in the whole length of the job and that was where the foreman responsible for the inlet did not realize the speed with which the paver was approaching and he failed to have the corrugated outlet pipe in place although the forms were ready. This resulted in the loss of just one batch at the paver.

Where the inlet was on the inside of a super-elevated curve and therefore against the center raised strip it was necessary to carry the water across under the other slab for disposal. In these cases asphalt-coated Armco paved invert pipe was used.

Some Details

On a few of the first expansion joints poured the contractor experienced some slight difficulty. Where the lip curb had been built after the header of the expansion joint had been pulled some of the lip curb concrete ran into the ¾-inch open joint and had to be removed when it came time to pour the joints. This trouble was quickly overcome by the use of a chisel bar about 18 inches long placed in a small pneumatic hammer operated by a Worthington compressor and the excess concrete was removed rapidly. The same compressor was used to furnish the air for blowing the joints as required before pouring.

The asphalt was heated in a portable Littleford kettle and then poured with ordinary watering pots.

The center strip between the two lip curbs was 4 feet wide and, after the concreting was completed and cured, was filled with a 4-inch stone base which was given a single bituminous surface treatment. In preparing the subgrade for the stone base the contractor used one of his batch trucks filled with earth to give it extra weight and rolled the base with one pair of the dual rear wheels. This was followed by hand trimming and a final rolling with a hand roller for smoothness. Being out in the country the contractor was somewhat disturbed to find that local people thought this rolled strip before the stone was placed made a fine bridle path and the horses' feet cut up the rolled earth, requiring repeating of the rolling.

Personnel

This project, WPMH 535-D, was awarded to the Pitman Construction Co. of Atlanta, Ga. on its low bid of $143,200. L. A. Pitman was Superintendent for the contractor and H. G. Holbert was Resident Engineer for the State Highway Board of Georgia.

Adams Joins Inland Steel

Avery C. Adams, formerly with the Carnegie-Illinois Steel Co., has been appointed Vice President and Assistant General Manager of Sales of the Inland Steel Co., Chicago, in charge of sales of all sheet and strip steel products.

SMOOTH ROAD BU

HOW CONTRACTORS USE A-C SPEED PATROLS TO CUT FINISHING AND HAULING COSTS

To handle the grading on a 296,000 cubic yard highway job, extending over a 10-mile stretch near Beresford, South Dakota, Jarvis Construction Co., tried an Allis-Chalmers Speed Patrol ... found it did such a smooth job of ditching, shoulder finishing and all around grading (see pictures here) that no other blade was required.

FINISHING THE FILL—Note the smooth bank slope left by the Speed Patrol. Its chatter-free blade cuts to ⅛-inch accuracy.

ONE-MAN OPERATION—With the Speed Patrol one man handled all the grading—ditching, shoulder finishing, crowning, cut and fill finishing, etc.

FOR FASTER HAULING—Here the Speed Patrol keeps hauling roads smooth and cuts and fills levelled off, so tractor-scraper outfits can roll at higher speeds with bigger loads. In addition it handles Raemisch's finishing work.

ALLIS-C

TRACTOR DIVISIO

New Pneumatic Saw

The new Davey pneumatic saw, recently announced by the Davey Compressor Co., Kent, Ohio, is a two-man easily transportable light-weight saw for felling trees, cutting off wood piles, and similar uses. It is made in standard 2 and 3-foot sizes.

The saw is firmly attached to the tree, thus relieving the operators of the burden of holding the saw in place and eliminating the necessity of fighting the thrust of the tool. The frame, constructed of light-weight durable steel tubing, is stationary with heavy guides between which the saw blade moves in non-sway strokes. Each saw is furnished with two blades and includes a built-in oiler which lubricates the entire unit.

Complete details on this new Davey saw, as well as on the entire line of Davey compressors, are included in the 60-page Davey Air Log, copies of which may be secured direct from the manufacturer by mentioning this item.

Carbide Floodlights Followed Hurricane

The National Carbide Corp., Lincoln Bldg., New York City, manufacturer of National portable carbide lights, has reported the great demand for its X-100 V-G 8,000-candlepower floodlights immediately following the hurricane, particularly throughout the New England States. In one instance the Boston District arranged to transport fifty of these floodlights by airplane from Williamsport, Pa., to Providence, R. I. The lights were received promptly and quickly put into use, floodlighting large areas during the time when the city was without electric lights.

Flagmen Wear Red Coats

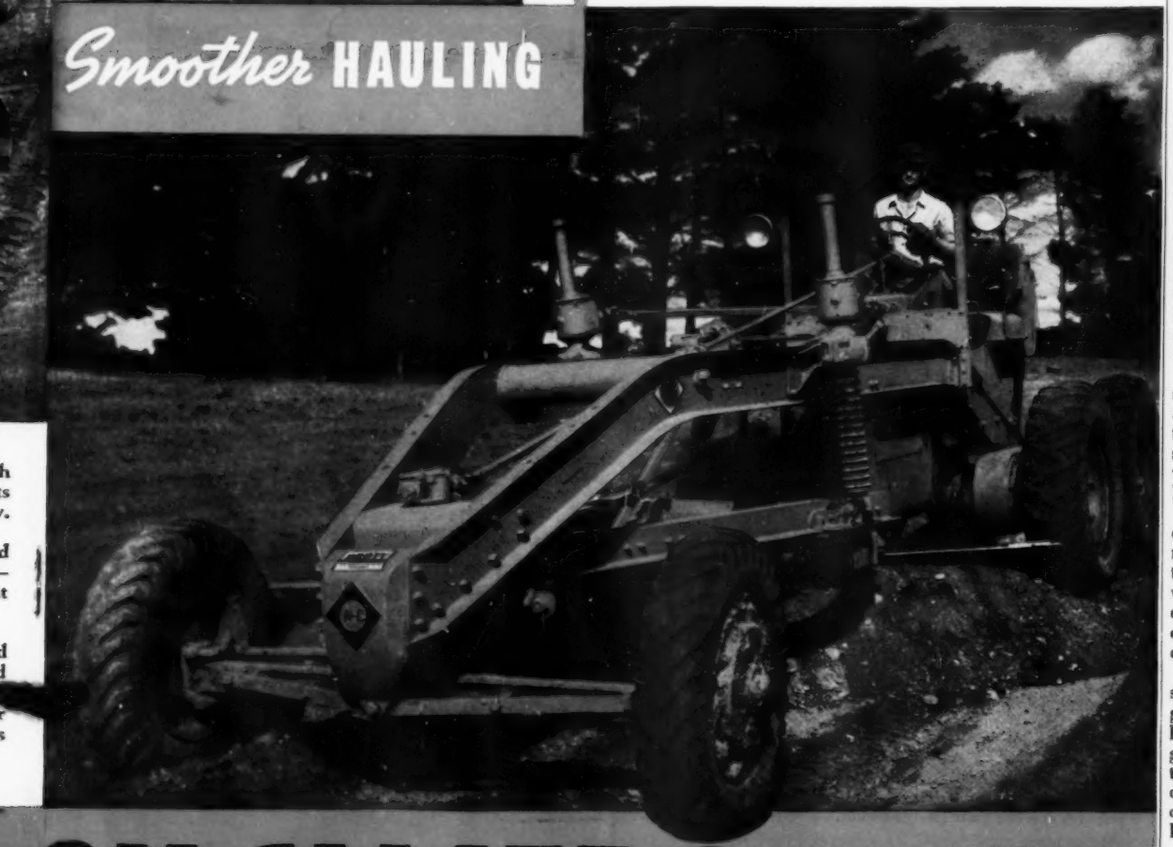
In re-surfacing and widening a section of Highway 99, between Whitewater, Calif., and Banning, Oswald Brothers was obliged to build one-half the road at a time because of heavy traffic. This method brought added danger of accidents where traffic was switched to the narrow passages. Better to attract the attention of motorists, and for protection of the flagmen, the latter were furnished scarlet coats, as well as red flags.

BUILDING

A firm believer in smooth operation is Henry A. Raemisch. To keep hauling roads in good shape and fills level on a 370,000 cubic yard highway job near Merrill, Wisconsin, he uses an A-C Speed Patrol. It fills in rain-catching pockets and eliminates speed-reducing roughness on hauls. As a result his tractor operators shift gears less, do not tire so easily ... his tractor-scraper outfits travel at a faster clip, carry bigger loads and make more trips each shift ... there's less wear and tear on equipment and important savings on tires and fuel.

Take the smooth way to roadbuilding profits, as these contractors have. Ask your Allis-Chalmers dealer to show you what a Speed Patrol can do on your job.

Smoother HAULING



-CHALMERS

IVISION—MILWAUKEE, U.S.A.

SPEED PATROLS

SINGLE OR TANDEM DRIVE

NO. 42 AND NO. 54 SIZES

GASOLINE ... DISTILLATE

... DIESEL FUEL OIL

Conn. Overpass Design Wins Welding Award

(*Continued from page 5*)

the curved and straight portions of the girder, thus giving the frame its final shape.

The flanges facing the road on both legs and the center support extend continuously to the underside of the top flanges of the ribs to which they are welded. These flanges are slotted to receive the rib webs and this joint is fillet welded, both sides. This method should prove to be an effective means of stiffening the rib at its point of maximum shear and negative moment, with a minimum of metal. This design is based on the use of hinges at the leg and center post footings and true hinges are used.

Cost Analysis

Comparison of the relative costs of the all-welded type of structure with the all-riveted type follows:

Estimated Total Cost of Welded Frame
(All Steel in Place, Ready for Continuation of Job.)

Gas cutting stock for frames	$ 177.60
Shop welding above	132.09
Machining and grinding outer surface	22.56
Stiffeners, welded, in place	11.71
Welding pin plates	7.03
Shoes, complete as shown	400.38
Diaphragms and swaybracing, cut and welded	93.10
Shop painting, except shoes	85.13
98,700 lbs. structural steel at mill @ $0.0235	2,319.45
Freight to shop on above @ $0.003 (52 tons considered for freight from shop, haul, load and unload only)	296.10
Transportation as shown	286.00
Erection 98,700 lbs. @ $0.005	493.50
Falsework as described	140.00
Field welding frames	622.31
Field welding bracing, etc	387.35
Ornamental paneling, etc	564.88
Ornamental railing, 200 lin. ft. @ $7.00	1,400.00
Field painting	217.13
Total Cost, all steel in place	$7,656.40

Estimated Cost of Riveted Frame
(All Steel in Place, Ready for Continuation of Job.)

Gas cutting stock for frames	$ 60.48
Shop rivets, 6,656 @ 0.08	532.48
Field rivets, 1,628 @ 0.28	455.84
Fabrication as explained	1,317.50
Shop painting	85.13
Shoes	671.40
Transportation as above	343.75
Falsework	140.75
Erection as explained	737.80
Ornamental paneling and grill work	564.88
Ornamental railing	1,400.00
105,400 lbs. steel at mill	2,476.90
Freight, mill to shop	316.20
Field paint	217.13
Total Cost, all steel in place	$9,320.24

In the foregoing it has been shown that the total cost of the welded structure, steel only, would be $7,656.40 and the riveted type would be $9,320.24, fabricated, erected, and painted, all complete in place ready for the deck or any other phase of construction.

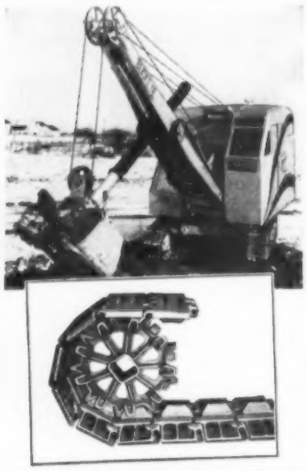
Throughout the cost analysis of each structure the utmost conservatism was adhered to, to prove beyond doubt that the welded structure was the less expensive. In every assumption, welding costs were estimated high and riveting costs low, as will be noted in the figures used.

The A. A. S. H. O. specifications under which this design was made are much more conservative toward welding than need be. Shear values of fillet welds are 25 per cent lower than A.W.S. considers good practice. Despite these conditions the welded structure is cheaper to fabricate and less metal is used.

There is little doubt that when this structure is placed in the shops, even greater economy will be effected than is here shown. When the designer's plans go to the steel contractor, practically all the information the shop requires is contained thereon. There is no complicated work for the draftsman to lay out his rivet and punching schedule, which also applies to the template shop. One fabricating shop which has built several single-span riveted rigid frames in New York and New England estimates the shop and drafting room costs at $0.0275 to $0.03 per pound, exclusive of metal. This, however, sounds high.

In the matter of erection and the comparison of field welding costs with field riveting, it will be noted that the welding again has a decided advantage.

(*Continued on page 31*)



A Buckeye Clipper Excavator, a Feature of Which Is the New Non-Clog Crawler Tread, Shown at Bottom

New Crawler Design Features Excavator

A new feature of Buckeye Clipper convertible excavators, made by the Buckeye Traction Ditcher Co., Findlay, Ohio, is the crawler traction design. This new patented crawler tread is claimed to have a number of advantages, the most important being its freedom from clogging. As shown in the illustration, there are no pockets in the tread where loose material can lodge, the single lug in the center and the wide roller track on each side of the lug providing a non-clogging surface.

Since the bearing surface on the top of the lug is cast to a radius similar to that of the sprocket rim, there is little wear on the rim where the load is carried. This bearing surface will not wear out of pitch and keeps the treads in a true pitch circle, according to the manufacturer. Another feature of this design is the way the treads fold around the tooth on the sprocket, with no rubbing of sprocket teeth in or out of engagement. This keeps wear on the teeth confined to drive pressure.

These new non-clogging crawler treads are now standard equipment on all Buckeye Clipper excavators.

Hercules Personnel Changes

Recent promotions at the Hercules Powder Co., Wilmington, Dela., following the recent resignation of J. J. Kelleher, include the appointment of J. Rex St. Clair as Manager of the Wilmington office of the Explosives Department and of Tom Brown as Manager of the Contractors' Division of the Explosives Department. Mr. St. Clair has been affiliated with the explosives industry since 1918. Mr. Brown, connected with the industry since 1911, has been associated with Hercules since 1929.

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New Small Scraper For County Work

The new small Model Z Carryall scraper, recently announced by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif., is particularly designed for county road construction and maintenance or as a utility tool for contractors. Designed for use with a D4 tractor, the Model Z can handle completely moderate-sized jobs from the initial cut to the finished grade and maintenance, according to the manufacturer.

Sturdily constructed of special alloy steel in a patented box-beam construction arc-welded together, the Model Z has four pneumatic-tired wheels, all mounted within the width of the scraper blade. It will make a non-stop turn in a 16-foot circle. Its struck capacity is 2.7 cubic yards and the heaped capacity 3.5 to 4 yards. Positive loading and ejection of the dirt is effected by the double cable action given by the double-drum power control unit independently controlling the apron and tail-gate. The bowl is self-cleaning and gives an even controlled spread up to 14 inches in wet or dry material. The reversible self-sharpening scraper blades are given a special heat treatment to permit long and efficient service in hard or abrasive materials.

Electric Hydraulic Lift Features New Snow Plow

A quick-reversible snow plow with electrically operated hydraulic lift has been announced by the Hercules Steel Products Co., Galion, Ohio, for use with 1½ and 2-ton trucks. The unit uses the Meyer Safety Blade, which enables the plow to scrape directly on the pavement. The blade operates as a safety trip, riding the plow over ordinary road obstructions without the use of springs or other tripping devices, according to the manufacturer.

Complete information on this new Hercules Model A snow plow may be secured by interested state and county highway engineers direct from the company or from this magazine.

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New 1939 Dodge 1½-Ton, 126½" W. B., Special Dump Body.

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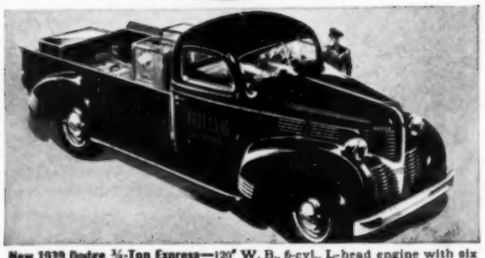


New 1939 Dodge ½-Ton Express—120" W. B., 6-cyl., L-head engine with six special gas and oil saving features. Many extra quality advancements. Body size 48¾" x 90", especially useful for handling bulky materials.

NEW Dodge trucks for 1939 give you distinguished new styling, new larger cabs, new rust-proofing, new features from one end to the other that will save you money on upkeep, make your truck last longer. Yet Dodge trucks are priced with the lowest! In "truck-built" Dodge trucks for 1939, Dodge gives you 5 vital advantages. Compare! Then see your Dodge dealer.

1 BONDERIZING—(Special Rust-proofing)—A revolutionary step ahead! Dodge bigger cabs for 1939, bodies, all sheet metal rust-proofed in huge new processing machines at the giant new Dodge truck plant.

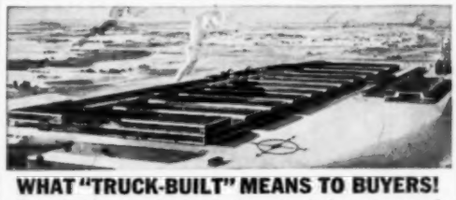
2 AMOLA STEEL—This new super-tough steel is used for 1939 in vital Dodge truck parts.

3 STYLING—Distinguished, streamlined appearance for 1939 makes Dodge a moving advertisement to build prestige for your business.

4 ENGINE—Dodge 6-cylinder L-head engine is simplest in design, has fewer parts, yet gives you many extra gas and oil saving features.

5 BRAKES—Dodge has genuine hydraulic type, fully equalized, stop quick yet save tires and brake linings.

NEW LOWER PRICES...EASY BUDGET TERMS



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Dodge has just completed a giant new truck plant, at a cost of millions, to carry on the tradition of Dodge "truck-built" quality. New manufacturing methods, huge new processing equipment, miles of ultra-modern conveyors, now make possible the greatest Dodge truck values of all time. See your Dodge dealer.

The New Marlow 6-Inch Pump

New 6-Inch Pumps With 2 and 4 Wheels

The new 6-inch Model 90M Marlow self-priming centrifugal, having a capacity of 90,000 gph, is being manufactured by Marlow Pumps, Ridgewood, N.J., with both 2-wheel and 4-wheel mountings. These pumps are particularly adapted for unwatering pier holes, caissons, bridge foundations and similar work. The pump has high-speed priming because of its larger tank which permits quick and thorough separation of the air exhausted from the suction line. The automatic valve prevents needless by-passing of water, so that all water pumped is discharged.

The pump is connected to a 35-40-hp 4-cylinder heavy-duty LeRoi engine by a rigid casting between the engine bell housing and the pump frame, maintaining positive alignment. There is a flexible coupling on the engine flywheel connecting to the pump shaft and the pump shafts are carried in oversized ball bearings. There is a handhole plate on the suction, adjustable wearing plates on the pump to compensate for impeller wear, and a large clean-out plate at the bottom of the tank for inspection and draining. The pump is reported to be self-cleaning, so that sand and other materials will not settle in the pump.

Marlow reports that they are now in a position to supply 2-inch 10,000-gph and 3-inch 15,000-gph pumps with Briggs & Stratton engines as standard equipment. The 8-inch Model 125M has a capacity of 125,000 gph and is powered with 50-60-hp 6-cylinder heavy-duty Waukesha Model BKU engine. Bulletin 38, describing these new Marlow pumps, may be secured direct from the manufacturer by mentioning this item, or through CONTRACTORS AND ENGINEERS MONTHLY.

A. E. D. Activities

During the past year, the Associated Equipment Distributors has been active in negotiating with manufacturers to secure distributor's rights in handling all business in their respective territories, including government bidding as well. Several manufacturers have pledged that all business, including government, shall go to the dealer, realizing that such handling is of advantage to both the dealer and themselves.

A. F. Sersanous, President of A. E. D., has traveled widely this year in the interest of the association and holding regional meetings.

Handling Heavy Loads

In a new well-illustrated folder "Safe Handling," recently issued by the Macwhyte Co., Kenosha, Wis., manufacturer of wire rope and braided wire rope slings, the use of the various types of Macwhyte slings for handling all types of loads, large and small, is described and illustrated. These braided wire rope slings are flexible, light in weight, and strong, and are available in a variety of types to meet all material and equipment-handling problems with safety.

Copies of "Safe Handling" may be secured by interested contractors and engineers direct from the manufacturer or from this magazine.

Cummins Expands Plant

In 1939 the Cummins Engine Co., Columbus, Ind., manufacturer of diesel engines, expects to double its 1938 sales volume which has been considerably in excess of its 1937 record, according to a recent report from this company. In order to provide for this expansion, a new building is now under construction which will be used for the finish and assembly of Cummins diesel fuel injectors and the assembly of diesel fuel pumps. This new factory and equipment will cost approximately $400,000.

The building, which is of all-welded rigid frame design, will be air-conditioned, the power for which will be furnished by a 500-hp VL 12-cylinder Cummins diesel engine. All machinery to be installed will be powered with individual motors, eliminating line shafts, reducing vibration and noise and providing greater safety for the workmen.

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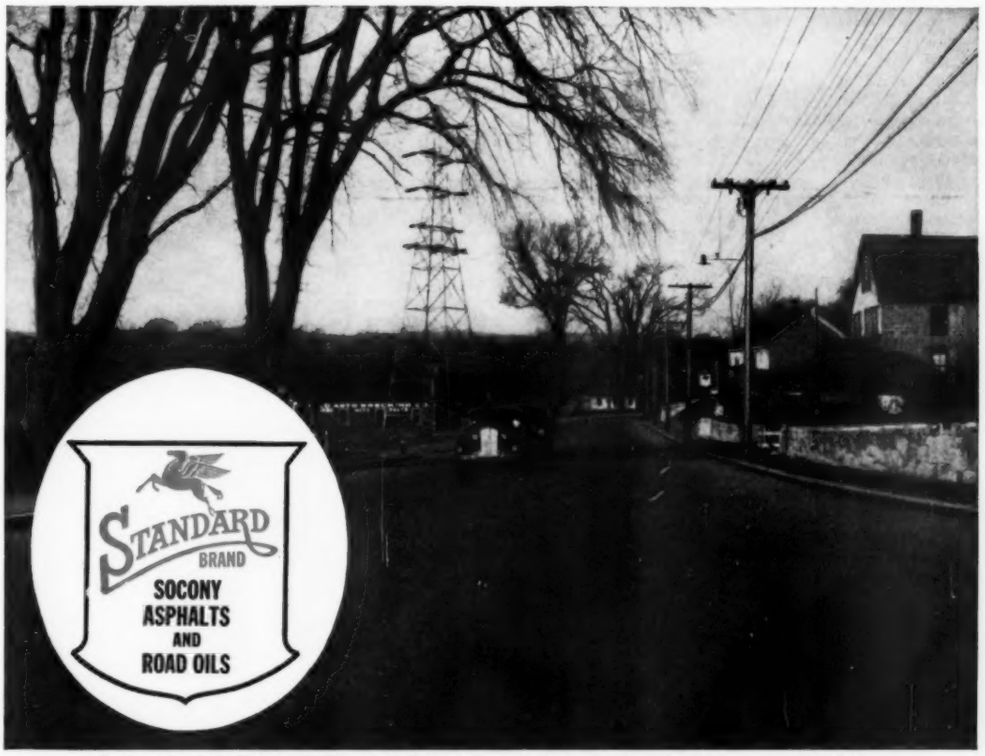

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SOCONY-VACUUM OIL CO.
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Labor Problem Is One of Economics

(*Continued from page* 11)

ly passes the cost on to the owner. It is therefore surprising how many of these same public officials and engineers, charged with the responsibility of predetermining wages on public work, censure the contractor for his attempts to keep predetermined wages down to the level consistent with the wage structure already in force. They lose track of the fact that there is such a thing as economics in every industry and that construction must compete with other industries for a share of the consumer's dollar. If construction costs increase out of proportion to the value of work done through artificial increases in wages, or any other items, the volume of construction will be reduced automatically.

Professor Wilford I. King of New York University was quoted: "One of the most dangerous economic fallacies in vogue at present is that hourly wage rates and short working weeks make for full employment and are advantageous to labor. This belief is the reverse of the truth. . . . The true problem of labor today is how to set the wheels of industry in motion; how to increase production."

George W. Taylor, formerly Chairman of the Philadelphia Regional Labor Board, and a sincere friend of labor states: "There is need for realization on the part of employees generally as well as inexperienced labor leaders that the right to collective bargaining does not necessarily mean an inexhaustible succession of wage increases and continuous improvement of conditions of work. Collective bargaining is a process for determining these conditions on an equitable basis with assurance to employees that the terms on which they work are the best possible ones."

John Donlin, former President of the Building Trades Department of the A. F. of L., said in a recent magazine article: "It won't do a craftsman any good to get $2.00 per hour and a 30-hour week if that would make his project too expensive for other people to buy it. . . . We, building trades fellows, are great people—we are the only ones who can successfully defy economic laws. Like hell we can."

There is a real danger that the growth of the nation's highway system will be stifled by the withdrawal of farmer support if wages and working conditions are allowed to get too far out of line with those applying to the farmer and his help. Farmers are tax conscious in contrast to the typical city dweller. Mr. Palmer said, "There is no use to tell the typical city dweller that public officials are spending *his* money. He won't believe it. There is no need to tell the farmer that; he already knows it."

Contractors are urged to make their position on this subject of costs clear to the public to counteract the impression which demagogues like to create; namely, that contractors' opposition to constantly increasing wages is dictated only by selfish attitudes.

Government's Attitude

In explaining the concern of many contractors in the West about the growing dispute between the A. F. of L. and the C. I. O., Mr. Palmer quoted one man as saying: "If I sign up now with the A. F. of L., and the C. I. O. gets into this field, it is likely, judging from its past record, that the National Labor Relations Board will favor the C. I. O. There is also a possibility that my supply of materials (mostly fabricated by C. I. O. unions) will be cut off as a means of pressure to get me to use C. I. O. men in the field. No. I'm going to wait until this matter settles down."

It was pointed out that while under the National Labor Relations Act, the Board administering that Act is barred from interfering in intra-state matters, the introduction of the Wagner-Healey Bills into the last Congress shows a desire on the part of the Board to reach into that field. This condition was cited as another deterrent to the development of better labor relations.

In Great Britain and Sweden

Everyone interested in this problem, and that should include every conscientious citizen, should read the reports prepared by the Commission sent to Great Britain and Sweden for the purpose of investigating and reporting on industrial relations there.

These reports show that unionization in these two countries has progressed much further than in America. In Sweden one in seven of the population is a union member; in Great Britain, one in nine. Americans are warned not to accept the demagogues' explanation that American employers are more selfish. There is no reason to believe that greater humanitarianism prompts the employer in either of these foreign countries. One explanation of the greater success in unionizing workers might be found in the fact that unions in those countries do not demand the closed shop. It is well known that this demand is a resistance point in America.

An outgrowth of the policy in Great Britain and in Sweden has been that many employers urge their employees to join the unions. Likewise, union leaders are constantly urging employers to join the trade association of their industry. Perhaps American labor leaders should reconsider whether the closed shop is as important to them as they have always considered it to be.

In Sweden the uniform wage does not apply. Age, experience and skill determine the rate of wage. Thus, in Sweden one artisan at 30 cents an hour may be working beside another artisan at 33 cents an hour. (These are actual rates.) This principle has always been recognized in America on open-shop construction. Perhaps this question deserves re-examination by American organized labor.

In reading these reports one is impressed by the length of the work week. In Sweden it is 48 hours and in Great Britain 44 to 48. British labor has taken 30 years to reduce the work week from 56 hours. This is infinitely better than the upset caused to American industry by precipitous reduction in working hours. These facts should urge organized labor to heed the warnings of some of our friendly critics cited above.

Both reports emphasize the sentiment of employers and employees against Government interference in their affairs. They both see the value, in the long run, of voluntary action, relying upon the principle of mutual benefit rather than upon coercion.

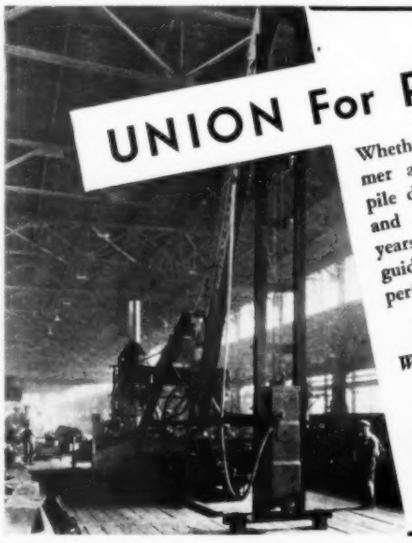
Unfortunately, many American observers appear to believe that we can not emulate these older countries in their labor relations on the ground that their homogeneity of population makes possible a spirit of cooperation and mutual respect which we in our time can not hope to attain here; that both sides to the labor relationship apply greater intelligence to their problems and that both approach the relationship with a higher degree of moral responsibility.

In conclusion, Mr. Palmer states that he wants to see and to aid in the development of more constructive relations between employer and employee in the construction industry—the most demanding problem both have to face. To deal with this problem conscientiously requires patience, tolerance and faith in the soundness of human nature.

Wood Treating Service

The Wood Treating Chemicals Co. has announced the opening of its main office at 332 So. Michigan Ave., Chicago, Ill. This company, the officials of which have had a long experience in wood preserving, is prepared to furnish chemicals for treating wood as well as to furnish consultant and engineering advice on the use of all types of wood and wood preservation.

Those interested in this subject may secure advice on preservatives and treatment direct from this company.



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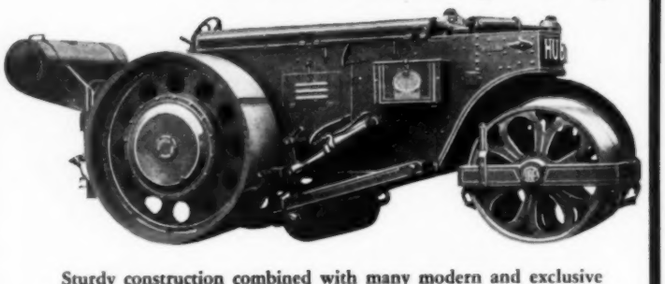

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Giant Steel Trestle Erected in 90 Days

3,600-Foot Structure for Grand Coulee Concreting Completed in Record Time by Bethlehem Steel Co.

By HENRY W. YOUNG

(*Photos on pages 1 and 32*)

✦ STARTING on June 13 and working under a subcontract with the Consolidated Builders, Inc., the Bethlehem Steel Co. completed the erection of the steel concrete-placing trestle at Grand Coulee on September 12. C. B. I. had previously taken down what remained of the old trestle and placed the old floor system for reframing by the Bethlehem Steel Co. at the fabricating plant at Electric City, 4 miles distant. This part of the work was started May 9 and finished July 1. On a project thus far characterized by world-beating construction problems and speedy accomplishments, this trestle job stands out among the record-making performances.

The trestle is approximately 3,600 feet long and the erection work was carried on with a crew of seventy-five trained steel workers, working a total of 80 hours a week in two shifts of 6 hours and 40 minutes each, six days a week.

Design of Structure

The structure was erected for the most part in 60-foot spans between towers 40 feet wide. There are, however, seven 97-foot 6-inch spans between towers 32 feet 6 inches wide, standing behind the power house at each end. Altogether, there are thirty-four towers and thirty-three spans, including the eight long ones, which last were necessary to make way for the penstock.

Columns for the towers are 14-inch H sections, ranging from 202 to 127 pounds per foot. Over the spillway section, the columns from deck top to concrete are approximately 204 feet high. All longitudinal bracing is 8 and 10-inch H section, while the transverse members are built of angles and lacing bars. The towers are battered transversely 5/8 inches in 12 feet.

In the deck construction, girders were used on the outside where the gantries run. The girders on the long spans are of the plate type, each weighing 38 tons. They are 8 feet 4 inches deep, with 18-inch cover plates and 100-inch webs. The length is 97 feet 6 inches.

In the 40-foot spans there are two girders with five 30-inch I-beam stringers. In the 60-foot spans there are three girders and five 36-inch I-beam stringers. There are also floor beams in the long spans to break up the length.

A total of 8,900 tons of steel was used, 5,700 tons of this being new material and 3,200 tons old material salvaged from the deck of the previous trestle, now buried in the first section of the dam. Some of the old beams salvaged were of silicon steel, which was used in the present 60-foot spans. All the rest of the material was standard structural open-hearth steel.

Erection

Most of the steel was erected with two traveling stiffleg derricks of 35 tons capacity and having 90-foot booms and 18-foot jib extensions. These are Bethlehem Steel Co. equipment and were used on Golden Gate Bridge. To get started at each end, two of the C.B.I. revolving derricks were employed.

The total width of the trestle is 43 feet center to center of the gantry rails. There are four standard-gage tracks on the deck, laid on 8 x 10-inch wood ties, spaced on 16-inch centers. Three x 12-inch planking is used for the deck.

Steel for the west end was delivered by railway car and hoisted on top at that end of the trestle. All steel for the east end was unloaded at Electric City and hauled from there to the site by trucks. In handling the big girders, two of the contractor's largest Mack trucks of 10-cubic-yard capacity were employed in tandem. Timber-work cribs were built upon the truck beds to a height to clear the cabs. Bolsters were placed on top of the cribs and a single girder laid flat on the bolsters, the ends projecting over the trucks front and rear. The 70-foot tower columns were, however, transported on a single truck and trailer.

Factory fabricated members were, of course, riveted, but in erection work everything was bolted, for reasons of speed and economy, since the structure was not to be permanent. In the towers and bracing, 7/8-inch carbon bolts were employed, with 7/8-inch heat-treated bolts in the floor system. Approximately 152,000 bolts were necessary, and air-operated impact wrenches were employed in the bolting work.

All steel for the trestle was furnished by the Bethlehem Steel Co., most of it being fabricated in the Chicago plant and shipped by rail, the Northern Pacific establishing the remarkable record of only seven days in transit, on the average. A portion was fabricated in two other plants, about 1,000 tons in the Alameda, Calif., plant and about 650 tons in the Buffalo, N.Y., plant. This work was under the general supervision of M. H. Frincke, Manager of the Erection Department, Bethlehem Steel Co., Los Angeles. L. L. Martin was Resident Engineer and C. W. Leatherman and G. A. McLain Foremen of the two shifts.

The Consolidated Builders, Inc., is the contractor for the construction of the second section of Grand Coulee Dam to its ultimate height. This is a U.S. Bureau of Reclamation project, for which F. A. Banks is Construction Engineer.

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C-9-38

Backsloping with an A-C Grader Pulled By One of the New Allis-Chalmers Model S Gasoline Tractors

New Gasoline Tractor

A new gasoline tractor, the Model S, which is similar in appearance and performance to the Model S-O controlled-ignition oil tractor which has been in the field for several years, has just been announced by the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis.

The Model S develops 77.66 hp on the belt, 64.52 hp at the drawbar and 16,732 pounds drawbar pull in first gear. The constant mesh transmission provides five forward speeds from 1.52 to 6.37 miles an hour and the constant mesh feature makes it possible to shift "on the go" like a truck. The tractor is offered in two tread widths of 62 and 74 inches.

A new 4-cylinder valve-in-head gasoline engine has been developed by Allis-Chalmers for this tractor. The bore is 5¾ inches, the stroke 6½ inches and the governed speed at full load 1,050 rpm. Like other A-C engines, it has removable cylinder liners and inserted valve seats. The feature of this engine, according to the manufacturer, is its fuel economy as tests show that a fuel consumption of only 0.5 pound per bph at 80 to 90 per cent of full load for continuous service.

The Model S is designed for use with snow plows, 7 to 8-yard scrapers, 12-foot blade graders, 10-yard wagons, bulldozers, winches, and similar equipment. A new folder describing this tractor may be secured by interested contractors and state and county highway engineers direct from the manufacturer or from this magazine.

New Tilting Mixer

Considerable extra strength has been built into the new 3½-S tilting mixer recently announced by the Ransome Concrete Machinery Co., Dunellen, N. J. Other features include lighter weight through the use of a new pressed steel unbreakable bowl, the opening of which is reinforced with a heavy steel band; a heavy semi-steel cast gear ring with accurately cast teeth securely bolted to the drum; a heavily-reinforced semi-steel casting yoke of I-beam construction; and a large high-carbon-steel bowl spindle with two oversize Timken tapered roller bearings which should, with proper lubrication, last the entire life of the mixer.

The drum of the mixer can be easily tilted to either side for charging or discharging by means of a large hand wheel operating through a large reducing gear. Both the gear and the easy operating friction brake which locks the drum in any position are fully enclosed to prevent accidents. The drum tilts in the direction in which the hand wheel is turned. The blade construction is the result of 88 years of experience and is designed to give the best possible mixture in a minimum of mixing time. A large roller bearing upon which the counter shaft revolves is easily accessible for lubrication or replacement. Power transmission is through a silent flexible double V belt.

The heavy steel plate bracings which tie in the 3-inch steel channel frame and the drum yoke supports are streamlined and the frame is hot riveted and well cross-braced. A large sturdy housing completely covers and protects the engine and drive and is fitted with louvers to provide ample ventilation. For high-speed traveling, the mixer is mounted on a trailer body with long leaf spring mounted axles, and pneumatic-tired wheels equipped with roller bearings.

Bulletin No. 153, describing and illustrating this new mixer, may be secured by those interested direct from the manufacturer by mentioning this magazine.

Snow Plows for Trucks, Tractors and Graders

Ross snow plows, made by the Burch Corp., Crestline, Ohio, were originally designed for use with motor trucks but the manufacturer reports that a demand for Ross plows for tractor and power grader mounting became so insistent that now all models of Ross Burch-Built snow plows are available with hitches for mounting on wheel or crawler tractors and on all types of power graders as well as on trucks. Features of these snow plows include great strength, self-alignment to the road surface, and a conical moldboard. They have either hand hydraulic or power hydraulic control.

Copies of a new 32-page Catalog H, describing and illustrating all of the 1939 models of these Ross Burch-Built snow plows, may be secured by state and county highway engineers direct from the manufacturer.

Galvin Joins LeTourneau

R. G. LeTourneau, Inc., Peoria, Ill., has announced the appointment of E. R. Galvin, former General Sales Manager of the Caterpillar Tractor Co., to a similar position in the LeTourneau organization. Mr. Galvin, who has been associated with the tractor business since 1925, has a wide knowledge of earth-moving problems.

LeTourneau reports that for the past five years its business has increased more than 1,400 per cent and that with new equipment developments and the resulting new markets, a man of Mr. Galvin's experience was needed to coordinate all sales efforts.

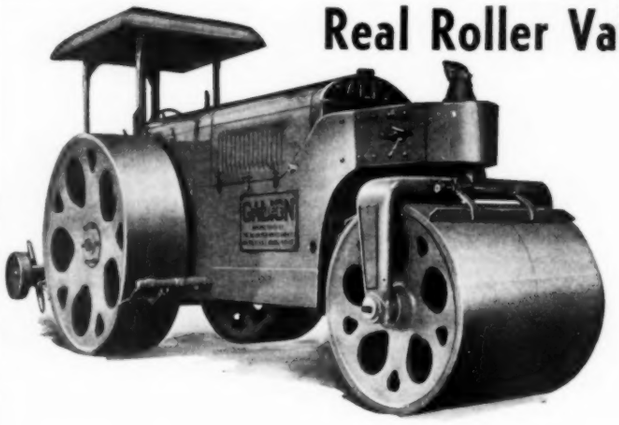
Guy and Stiffleg Derricks

American steel derricks in medium and heavy-duty stiffleg types, guy derricks, marine and barge derricks, American-Terry steel erector's derricks, and special equipment and accessories are described and illustrated in a 24-page well-illustrated booklet recently published by the American Hoist & Derrick Co., St. Paul, Minn.

American steel derricks are designed to meet not only the stresses of handling the load but all other stresses such as forces due to wind pressure, impact, inertia of parts in slewing, whipping of line, shocks and wrenches, with a liberal factor of safety.

Copies of Catalog D1.2-38-10M "American Steel Derricks" may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item or from CONTRACTORS AND ENGINEERS MONTHLY.

Real Roller Value



Hydraulic steering alone makes the Galion Chief 3-wheel roller outstanding—but in addition you get a precision-built job with many other advantages to provide the utmost in service and economy.

Read about the heavy duty transmission, efficient differential lock, roll-a-plane attachment, powerful scarifier, and the choice of either gasoline or diesel power in Catalog No. 225, just off the press. Learn why the Galion Chief gives you real roller value.

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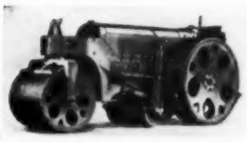
GALION, OHIO

Export Division: Columbus, Ohio

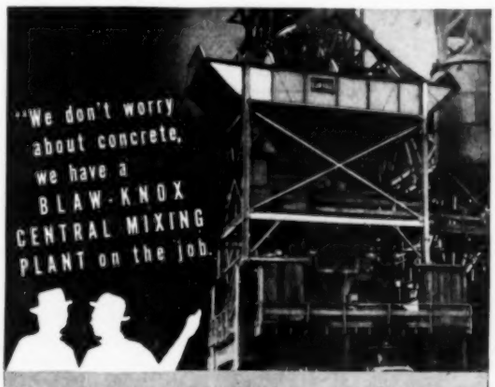


Blaw-Knox is the only manufacturer offering complete equipment for ready mixed concrete, including Trukmixers and Agitators, Ready Mixed Concrete Plants and Truck Mixer Loading Plants of all capacities and types.

Send for Blaw-Knox Catalogs Nos. 1566 and 1582.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.

BLAW-KNOX Truck Mixer LOADING PLANTS



Engineering advice, based on sound experience, is offered as a part of Blaw-Knox service in the design and arrangement of a central mixing plant for your job.

Stationary or floating plants, manual or automatic in operation, have been furnished on hundreds of jobs. Many of them are illustrated in Blaw-Knox Catalog No. 1566.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.
Offices and Representatives in Principal Cities

BLAW-KNOX Central Mixing Plants

C. & E. M. Photo

A Typical L-Head Wall to Care for a Small Creek at the Left, and a Drainage Ditch at the Right

Relocating U. S. 19 In North Carolina

(*Continued from page* 12)

the tile and also the constant percolation of the water into the stone and tile from the surface and hence the filling of the stone with earth.

Slides

Two slides of considerable proportions developed on this work. The larger, not as apparent to the casual observer, may develop into a major problem for the maintenance forces at a later date. The larger slide was in a cut 35 feet deep and 300 feet long at Station 143 on the south side of the cut. The face of the cut moved 1½ feet toward the road and raised the subgrade 8 inches. This was removed from the roadway section and the contractor relieved of any further responsibility for movement of the earth.

A 6-inch tile drain in the ditch on the south side of this cut was completely crushed when the slide occurred. It was replaced by a 6-inch perforated corrugated metal drain. The major break of this slide was 165 feet back from the roadway and the total volume of the slide as estimated from the cross-section of the material in apparent motion was 20,600 cubic yards.

The second slide was at the east end of the work at Station 490 where about 4,000 cubic yards of rock gave way at a rotten seam and crashed down on the roadway, doing no damage except to the completed T.B.M. base at that point.

The T.B.M. Base

The clay subgrade of the road was weak in spots and at these points the standard 6-inch T.B.M. base was increased to 8 inches thickness. The 20-foot surface is flanked on either side by 5-foot shoulders. There was no subgrade preparation other than the increase in the thickness of the base stone where there were signs of weakness. The subgrade was crowned 2 inches and at curves the super-elevation ran to a maximum of 0.12 foot per foot. The subgrade was bladed with a Galion motor patrol with a 12-foot blade and some hand labor.

Eight inches of crushed stone that laboratory analysis showed to contain granite gneiss, biotite gneiss and hornblende gneiss from 1¼ to ¼-inch screen sizes was spread over the subgrade and consolidated to 6 inches by traffic and constant blading with the motor grader. No rolling was used. This process of compaction under traffic required about two months. Heavy traffic and wet weather at certain times speeded the compaction of some sections. During dry weather the contractor resorted to water wagons to aid in the work.

Later in 1938 this T.B.M. base is to be surfaced with a double bituminous surface treatment.

Personnel

Projects 9800 and 9803 were awarded to Nello Teer of Durham, N. C. on his bid of $229,725.40 combined and exclusive of the high bridge. The work was in charge of George Johnson and Eddie Purcell as Superintendents for Teer. A. B. Cole was Construction Engineer for the State up to the time of his death and was succeeded by W. M. Corkill. J. C. Walker was Division Engineer and A. A. Siler was Resident Engineer for the North Carolina Highway and Public Works Commission.

Remember the A.R.B.A. Convention and Highway Exhibit to be held in San Francisco March 7 to 10. The A.G.C. also meets in San Francisco March 5-11. Why not attend both?

Union Carbide Appointments

J. N. Walker, formerly General Sales Manager of The Linde Air Products Co., has been elected Vice President of Oxweld Acetylene Co., also a unit of Union Carbide & Carbon Corp., New York City. T. D. Cartledge, formerly Assistant General Sales Manager, has been appointed General Sales Manager of The Linde Air Products Co.

The F-4½ Barrow is built for easy loading or dumping, correct width for hoists, deep tray for wet concrete or mortar, Never-slip axle, 16" wheel with ball bearings, etc.

F-4½ Barrow—Pneumatic Tire

LANSING COMPANY
LANSING, MICHIGAN
Chicago New York Philadelphia Kansas City
San Francisco Boston Minneapolis

Better Construction Profits

USE RIGHT BUCKET FOR THE JOB

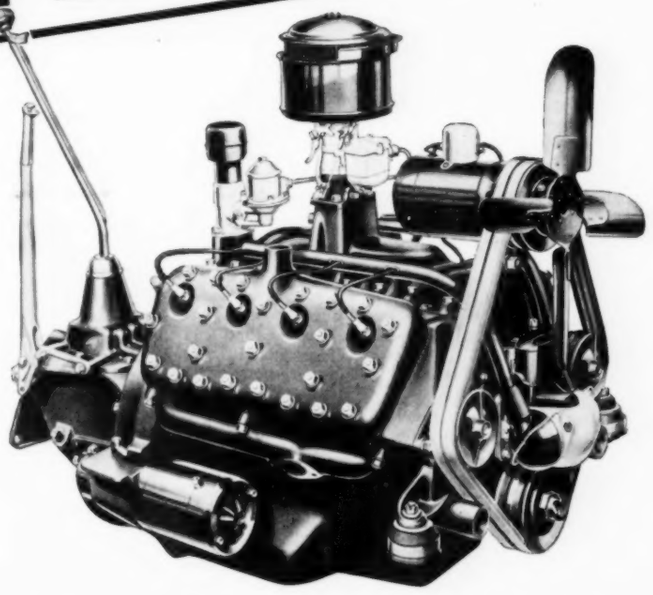
Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

HAYCO

THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

LIFE BEGINS AGAIN



This Ford V-8 engine holds an impressive record for service. Behind it are thousands of miles of payload performance . . . countless tough jobs, done with the V-8 dependability and economy for which Ford engines are distinguished.

Now its second life begins. Factory reconditioned, it is ready to give new engine performance with new engine economy. That's the way the Ford Engine and Parts Exchange Plan works. And for you, this unique plan does two things:

IT SAVES YOU TIME

It's much quicker to get an exchange engine or other assembly through a Ford dealer than it is to tie up the truck and wait for the original unit to be repaired or overhauled. In the case of the engine, the Exchange Plan often cuts this time from days to hours.

IT SAVES YOU MONEY

It's a Ford idea that the factory which builds the engine is best equipped to recondition it. Ford uses the same efficient methods, and the same types of precision machines in reconditioning that are used in making the original units. This cuts costs, and you get the savings.

These parts also included in the Ford Exchange Plan

FORD V·8 TRUCKS AND COMMERCIAL CARS

PICKS and SHOVELS

By O. E. POTTER

"Sidewalk Superintendents" Get Reserved Space for "Big Show"

(*Photos on page* 32)

At long last, the tremendous entertainment value of a power shovel at work has been officially recognized. That passersby are unable to resist the lure of excavation going on has long been the source of jokes in the construction fraternity and the inspiration of numberless cartoons on various aspects of this theme. Recently a Hollywood wag, observing such a fascinated gathering at the site of some foundation excavation in the movie capital, is reported as suggesting that the contractor erect a sign reading "Excavations Are Your Best Entertainment."

At Rockefeller Center in New York City, the home of such spectacular entertainments as "The Great Waltz" and "White Horse Inn," the curiosity of this ever-present audience variously known as sidewalk superintendents, kibitzers and, on occasion, by less complimentary names, has been gratified by the formation of a Sidewalk Superintendents' Club. A privilege of membership is the right to stand in a gallery specially provided to insure a full view of the big show going on in the excavation for the foundation of the new 16-story building in the south block of Rockefeller Center. This Club headquarters consists of an area 100 feet long, with a waist-high fence along the excavation, above which is a wire netting of ½-inch mesh reaching to the roof of the gallery which shelters the audience from the elements. At either end is a semi-circular rotunda, protecting the kibitzers from passing sidewalk traffic, although our own staff sidewalk superintendent reported that during several hours' attendance at the Club few people *passed by*. The structure is painted a neat grey, with the club's name in maroon and the specially designed coat of arms reproduced on the rotunda at each end in maroon and yellow.

The coat of arms, which appropriately bears as motto an old Dutch proverb "The best pilots stand on the shore," has four emblems. In the upper left quadrant is a windmill, in tribute to the building under construction which when completed will contain the New York City headquarters of the Holland House Corp. of the Netherlands. The significance of a ground hog digging in the upper right quadrant and of an excavator in the lower right is obvious and the lower left quadrant contains a pick and the broken face of a clock, to indicate killing time.

A uniformed attendant passes out membership cards which bear the Club's coat of arms and the legend "The Sidewalk Superintendents' Club, Rockefeller Center, welcomes you as a charter member, and extends the privileges and courtesies of the Club to the bearer of this card." He also answers questions which run the gamut from "What are they doing down there?" and "How much will the building cost?" to "Are there any social benefits in belonging to this Club?" During one morning 1,800 membership cards were given out, and on our visit to the Club, over 200 people were crowded as close to the netting as possible, just looking. Inquiry indicated that they all thought the Club an excellent idea and that none of them knew why they stopped to watch excavation. The genial Bill Wright remarked, between handing out membership cards and answering questions, that the reason is just plain unadulterated human curiosity.

Previous to the formation of the Club, a view of the proceedings had to be secured by a fascinated public through almost non-existent cracks, knot-holes and the openings for trucks in the high board fence surrounding the work. Some of the more ingenious on-lookers went snooping around looking for knots in the fence and when they found them proceeded to remove the knots with stones or other implements, thus providing themselves with a private view of the sub-surface drama. These, of course, were the ambitious and inventive few. Others just looked disconsolate when told to move on from the openings to the truck ramps.

It is reported that the Club had its beginning in such an experience of Mr. John D. Rockefeller Jr., who finding construction of considerable interest himself stopped at the opening of a truck ramp to see what was going on inside. As he pressed nearer to get a better view, a watchman stepped forward and said gently but firmly "Keep movin', Buddy." Mr. Rockefeller "kept moving" but then and there the Sidewalk Superintendents' Club had its beginning.

To insure the satisfaction of its large but exclusive membership, a suggestion box is maintained at Club headquarters where sidewalk superintendents may drop in comments or suggestions. To date, over 200 have been received. One of the most frequent requests is for a clock so that some trifling matter like a business appointment or getting back to one's job won't be missed entirely because of the urgency of supervising that truck load of rock or the next blast. The latter seems to be of particular interest and a number of requests have been received for some kind of signal, sufficiently in advance of the blast, to warn the on-lookers so that they will surely not miss it. Others suggested that coffee, or any kind of refreshments, would be welcome. Still others would like seats, reserved if possible, and with the coming of cold weather, the subject of a heated area is growing in importance. One ingenious on-looker suggested a moving sidewalk so that the sidewalk superintendents could continue to stand in their places and be taken entirely around the block, thus having an opportunity to view the scene of activity from every angle. Because of the large number of questions about the work itself, a bulletin board is to be put up on which a daily progress report will be posted, as well as general information on the job.

It would seem that all this must be the last word in providing for sidewalk superintendents, but the New York *World-Telegram* of November 21 carried a report which goes this one better. Frank Case, mine host at the Algonquin Hotel in New York City, noticed a crowd of men and women watching the workmen tearing up 44th Street near the hotel. So, being touched by their patience and interest in their city, Mr. Case had a dozen or so chairs carried from the hotel to the curb for the convenience and comfort of the starers.

A New Coating for Creosoted Surfaces

A new paint, the product of research and testing over a period of several years, for use in coating creosoted surfaces has recently been announced by the Reilly Tar & Chemical Corp., Indianapolis, Ind. Reilly Creocote paint is available in five colors, green, yellow, red, black and brown, and may be applied over new or old creosoted wood surfaces.

Creocote provides a coating which forms an effective seal through which neither pitch nor creosote will penetrate, and dries to a hard bright finish which is highly resistant to abrasion and wear and is impervious to oils and dilute acids. It serves to improve the appearance of creosoted structures or posts along the highway and increases their visibility as well.

Complete information on this new coating may be secured by interested state and county highway engineers from the producer by mentioning this item or from CONTRACTORS AND ENGINEERS MONTHLY.

New Screw Conveyors In Chain Belt Line

Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis., has announced the addition of a complete new line of screw conveyors and steel buckets. While the company has always made some screw conveyors and steel buckets, the rounding out of the line has been made possible by the acquisition of the machinery and drawings of the Weller Mfg. Co., Chicago, Ill. The manufacturing operations will continue in Chicago, where the company is occupying 12,000 square feet of floor space at 4425 West Cortland St.

GOOD USED EQUIPMENT
For Sale

Lorain shovels, cranes, draglines—from ¾ to 1¼ cubic yards.
Jaeger concrete mixers.
Gardner-Denver air compressors, wagon drills, jackhammers.
Euclid and Rug trucks.
Allis-Chalmers L, LO and WK tractors and crawler wagons.
Other miscellaneous equipment. Write to:

H. E. GILLIOZ, INC.
Broadway Hotel Bldg. Monett, Mo.

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8531 Gratiot Ave. Detroit, Mich.

Built to Last . . .
and
Move Dirt Fast!

● Williams Buckets stand up in service. They are ruggedly built of selected steels. Welding plays an important part in their construction to eliminate excess weight and provide greatest strength against shock and strain. Power mechanism is designed to develop tremendous digging power, and smooth, fast action. These buckets are scientifically designed throughout for maximum efficiency.

Williams distributors located in all parts of the country are competent to offer valuable field service.

Williams Multiple-Rope Buckets in all types and capacities, feature exclusive double hinge construction.

THE WELLMAN ENGINEERING CO.
7912 CENTRAL AVENUE, CLEVELAND, OHIO

Individual bulletins sent free on request.

WILLIAMS *Buckets*
***built by* WELLMAN**

Buffalo Springfield
STRENGTH and DURABILITY plus ECONOMY
Made in 12 Models, from 2 to 21 TONS—
TANDEM—3-WHEEL and 3-AXLE TANDEM
GASOLINE OR DIESEL POWERED
Full details will be sent upon request

THE BUFFALO-SPRINGFIELD ROLLER CO
Springfield, Ohio, U. S. A.

Three Conventions to Meet On West Coast Early in 1939

The irrestible lure of sunny California plus the interest in the Golden Gate Exposition seem to have drawn 1939 conventions westward.

The Twelfth National Asphalt Conference will meet in Los Angeles during the week of February 27, 1939, the Associated General Contractors of America, Inc., will convene in San Francisco from March 5 to 11 and the American Road Builders' Association Convention and Highway Exhibit will be held in San Francisco March 7-10.

The meetings of these three important groups in the construction field being held so close together in time and place means that for the first time in their history it will be possible for those interested to attend all three with the minimum of traveling and lost time between conventions.

New Highway and Viaduct Example of Modernization

The Fosters grade separation and highway relocation on U. S. Route 22 north of Cincinnati, Ohio, dedicated in October, is a particularly good example of the work being done to modernize highways. An old winding road with narrow bridges, sharp curves and poor sight distances has been replaced by a highway and viaduct that is modern in every detail. The project, which includes a crossing of the Pennsylvania Railroad and of the Miami River, cost over $500,000, of which $400,000 was from Federal and $100,000 from state funds.

In commenting on the national program of grade crossing elimination, Thomas H. MacDonald, Chief of the U. S. Bureau of Public Roads, said, "We are rapidly doing away with the most dangerous railroad-highway crossings in every state. Unquestionably we shall look back on this program as one of the most advanced and productive undertakings of this period."

New Browning Crane Dealer

The Browning Crane & Shovel Co., Cleveland, Ohio, recently announced the appointment of the Farmers Implement Co., Chehalis, Wash., as its representative in the Northwest.

STANDARD OIL
ASPHALT
PRODUCTS

. . . HELP FIGHT MOISTURE AND CORROSION . . .

● PROTECTION AGAINST MOISTURE and corrosion is essential if any man-made structure is to endure even a few years. Standard Oil Company has developed many asphalt products for this purpose that are indispensable to the building and construction industry.

Only a few of the many hundreds of uses for Standard Oil Asphalt Products are illustrated here. Tested specifications have been worked out for applying asphalt for damp-proofing cement and other materials used in buildings, tunnels, retaining walls, etc. Corrosion resistant asphalt coatings are available for tanks, metal roofs, bridges, etc. In each of these applications the experience of thousands of users assures your satisfaction.

When in doubt as to the right asphalt product for any purpose get in touch with a Standard Oil Asphalt representative. Call the local office or write 910 S. Michigan Ave., Chicago, Ill.

● **LONG LIVED ROOFS.** Standard Roofing Asphalts include types for priming coats on roof construction or for the rejuvenation of old roofs, and asphalt for built-up roofs of various pitches and surfaces. To get long life from any type of roof construction specify the correct Standard Asphalt Product.

● **RUST PROOFING METAL.** Tanks, beams, metal roofs and many other metal surfaces exposed to corrosion may be protected with an asphalt coating applied cold. It combines the extra protection of asphalt with the convenience of brush application.

● **WOOD PRESERVATION.** Standard Asphalts for treating poles and timbers are designed to give maximum penetration for longer protection against weathering and decay of the treated parts. Consult the Standard Oil Asphalt representative for the right type of product for your purpose.

● **LEAK-PROOF SEWER PIPE JOINTS.** Pipe joints made with Standard's Korite are permanently sealed against leakage. It resists the ordinary alkalinity and acidity of sewage and does not become brittle or deteriorate with age. Details of sewer pipe joint construction using Korite are available.

Copyright 1938, Standard Oil Co.

Asphalt for every purpose STANDARD OIL COMPANY (INDIANA)

Prison Labor Used In Louisiana Parish

(*Continued from page 9*)

flume.

A platform measuring 16 x 32 feet with a flume 12 inches deep and 24 inches wide running about two-thirds the length of the platform was built at a height of 22 feet from the ground. The flume has traps that are removable so that pit-run gravel can be shoveled in at any point along the flume. An earth ramp of the stripped material was constructed up to the platform.

The discharge from the 5-inch pump is used to flush the material along the flume to the sloping screen and at the bottom of the screen the discharge from the 4-inch well pump is used for the final washing. The screen is placed at a 36-degree angle and all oversize, over ½-inch, goes to the large hopper below which discharges into trucks beneath for hauling to the road. The sand and dirt wash through the screen into a wood flume which makes a right-angle turn about 40 feet from the initial screen. In the angle is set another screen for the removal of sand and pea gravel. The fines and water continue in a 60-foot flume to the ravine and stream below.

The average production of the plant is from 100 to 200 yards of material handled in a 10-hour day with prison labor. On a day when 318 cubic yards of pit-run material was put through the plant there was recovered 96 yards of washed gravel and 16 yards of pea gravel. The pit runs very high in sand for which there is little or no use in the locality. There is little call for the pea gravel at present but it is being stockpiled for possible future black-top work. The parish has used some for non-skid work on slippery hills, applying the pea gravel about ½ inch thick.

Prisoners' Stockade and Quarters

At the airport is a well-kept stockade with grass lawns surrounding the buildings within the wire fence. There are four cell blocks 24 x 96 feet in one building and with a double guard house 10 x 36 feet. The dining rooms and kitchen are together in one building measuring 24 x 30 feet. The buildings all have concrete floors and 2-inch car siding for walls, sealed on the inside. A small hospital building contains a bed room, shower and medicine chest. The kitchen is operated on contract, with the parish furnishing utensils, fuel and the services of two trusties.

Labor Organization

Laborers in the Road Department receive a minimum of 30 cents an hour and all truck drivers 35 cents. The leadermen and motor patrol operators receive 40 and 45 cents while the shop men, guards and fleetmen are on a salary basis ranging from $90 to $165 a month. The Engineering Department covering the whole parish has two men with salaries from $150 to $165 a month. A graduate engineer and one practical engineer handle all the survey work with men paid 30 cents an hour. The Road Department handles all the engineering work for the WPA projects, maintaining a force of 100 to 300 laborers at work.

The organization at the east center comprises: two mechanics, one blacksmith, one fleet man delivering gas and oil and keeping time, three guards for day and one for night service, one extra guard when prisoners are operated in smaller groups, two trusties in the shop, three motor grader operators, four tractor operators, three blade men, twelve truck drivers, three to six in the bridge crew, and one general utility man greasing and doing handy work. The tractor and motor grader operators assist on repairs in the shop when needed.

At the center covering Wards 6 and 7 there is one tractor operator, one blade man, one ground man and a truck driver. The same organization exists at the center for Wards 8 and 9, with a leaderman at each center.

Drainage

To care for the drainage of ditches under roads the Parish is purchasing about $200 worth of asphalt-dipped culvert pipe per month in its program of general improvement with longer lived drainage facilities. These are used to replace old wooden culverts, and all small bridges are being replaced with concrete and metal culvert pipe.

Concrete pipe makes up about half the culverts and is used in sizes from 15 to 36 inches. Asphalt-dipped corrugated culvert pipe is used from 18 to 72 inches in diameter. An unusual type of drainage structure is used in this parish in the placing of old boilers from oil fields for culverts. These are from 36 to 60 inches in diameter and can be purchased at from $1.50 to $2.00 a foot and have a great many years of service in their shells. They are spot-welded together and set for culverts.

Heavy-Duty Engines For Construction Jobs

The Franklin Aircooled Model 6A-400 heavy-duty engine for use in trucks, compressors, tractors and similar construction equipment is described in a 4-page bulletin which also contains an installation diagram, power chart and specifications of the unit.

Copies of this bulletin may be secured direct from the Aircooled Motors Corp., Syracuse, N. Y., or from CONTRACTORS AND ENGINEERS MONTHLY.

Performance Tests of Commercial Under-Drains

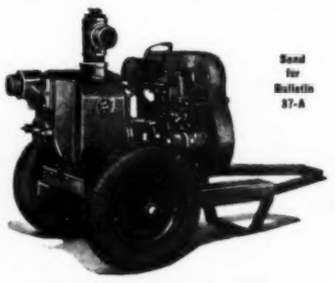
A study of comparative performance tests of various types of commercial under-drains was recently made by Charles M. Allen, Professor of Hydraulic Engineering, Department of Mechanical Engineering, Worcester Polytechnic Institute, Worcester, Mass. The report of this study, which was sponsored by Robinson Clay Product Co. of Akron, Ohio, and Dimick-Mosher Co. of Boston, Mass., is replete with photographs, diagrams, charts and other data showing tests on cast iron skip-pipe, clay skip-pipe, perforated corrugated iron pipe, perforated clay pipe, porous concrete pipe and solid glazed tile.

A four-page folder, containing some of the diagrams and charts as well as some of the findings of this report, has been published by the Robinson Clay Product Co., from whom copies of this folder may be secured by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Hard Facing Alloys Used in Australia

Word comes from "down under" that hard-facing alloys are being used quite extensively in Australia. A typical case is that of a Melbourne contractor who had the job of removing an old cable foundation in order to make way for an electric tramway.

The concrete foundation was first broken up with pneumatic picks, and the concrete was removed with a ½-yard shovel having a special boom guide. The bucket thus was handling broken concrete, rock spalls and different types of clay of a particularly abrasive variety. The ordinary cast steel teeth and double-shear side shoes originally used were found to have a life of approximately ten weeks. These shoes and teeth were then all hard-faced with Haynes Stellite, a cobalt-chromium-tungsten alloy, and were reported to be in perfect condition after fifteen weeks of use.



3" High-Capacity Pump

Marlow self-priming design on double tube pneumatics. 20,000 gallons per hour. Self-priming up to 25' *guaranteed.* Especially satisfactory in pumping very dirty water.

Manufactured by

MARLOW PUMPS
Ridgewood New Jersey

SAVE UP TO $1925 ON YOUR BITUMINOUS SPREADING AND PAVING EQUIPMENT To meet a liquidation deal we are authorized to offer the below listed factory-rebuilt machines, with full one-year guarantee, at these greatly reduced prices and special terms:

1. $500 down payment holds any machine for spring delivery—balance in monthly notes to September 1, 1939.
2. Or we will allow 5% discount for cash purchase.

One 1936 Model Jaeger 9-12 Ft. Bituminous Paver, with semi-crawler wheels, oscillating screed, blending wings for finishing up to curb, etc. **$2750**

One 1937 Model Jaeger 9-12 Ft. Bituminous Paver with patented "hot oil" heated screeds adapted for all types of work, including sheet asphalt. Full oscillating, heated blenders, semi-crawler wheels. (Additional adjustment for 14 ft. width available.) Used on only one job. Cost new, $5675. Can be bought for only **$3750**

One Jaeger Mix-in-Place Road Builder, tractor pulled, complete with 75 H. P. engine and leveling device for laying perfect riding roads. For building up to 2" retreads. Widely used for retreading old roads of all types and for stabilization work. Records of up to 2 miles of finished 22 ft. road in one day have been laid with this machine. Original cost, $4950. Machine is just like new. Now priced **$3350**

Heavy duty Pugmill Mix-in-Place Road Builders, self-propelled, for stabilization and heavy mat work up to 16 cu. ft. windrows. Both new and used machines for sale and rent.

Above Equipment Offered Subject to Prior Sale

THE JAEGER MACHINE COMPANY
701 DUBLIN AVE., COLUMBUS, OHIO

Another New *Money Saving* Trailer!

AGAIN the C. R. Jahn Co. leads the way with a new size All Purpose Trailer—a six wheel unit that will handle loads up to 45,000 lbs. and brings you the loading ease of the Jahn single purpose trailer and the four wheel all purpose trailer (shown below).

Look at the list of advanced engineering features offered in the Jahn All Purpose Trailer.

- Single purpose loading feature of removable front axle.
- Low loading platform.
- Platform flush with outer channel.
- Standard size tires available anywhere.
- Brakes on rear wheels, loading ramps, lash rings, stake pockets, heavy draw bar safety chains, reflectors, flag sockets are standard equipment.
- Either tandem or dual oscillating rear axles.

For smaller loads there is the four wheel all purpose trailer which will handle loads up to 30,000 lbs. Other models for all heavy duty service up to 60 tons capacity.

It will pay you to investigate Jahn trailers.

C. R. JAHN CO.
General Offices and Plant
1347 W. 37th Place, Chicago, Ill.

"COME TO TRAILER HEADQUARTERS"

Contractor Lays 1,300 Feet of Hot Mix Daily

(*Continued from page* 14)

one asphalt weighman; two plant oilers; one man to oil truck bodies on each trip; one foreman.

Truck Hauling

The hauling fleet consisted of from eleven to fifteen trucks rented locally. They were provided with different roads for reaching the job almost every day and the contractor saw to it that a patrol grader went over these roads every morning before hauling began so that they would be in the best possible condition. There were many bad turns and grades on the roads and in spite of the warnings given to the men there were several bad spills, resulting in the loss of the batches but not any severe damage to the drivers or to the trucks. The trucks hauled one batch of 10,000 pounds per load on the regular 1½-ton chassis.

Preparation of Subgrade

The subgrade was stabilized with sand and gravel. The original subgrade material was sand-clay and clay-gravel. This was scarified to a depth of 6 inches and the required amount of sand and gravel added and mixed with a disk harrow and a blade. The subgrade was then opened to traffic for a period of five months during the winter. The specified time is 30 days. During the entire period the subgrade was maintained daily with a patrol grader to the 1½-inch crown which was required in the subgrade so that the binder and top courses of hot-mix would be of uniform thickness. The final compaction of the subgrade was done with a 9-wheel Bros rubber-tired roller. To aid in the final compaction the contractor used two Ford trucks mounting 1,100-gallon tanks to sprinkle the grade to give maximum compaction. The water was supplied by a Jaeger SurePrime pump located for a part of the time in a creek and the remainder of the time on the bank of a river.

At the end of the compaction period the grade was given a final shaping, checked with a crown template and straight-edge, allowed to dry and then primed with 0.3 gallon per square yard of Koppers tar. The final shaping was done with an Allis-Chalmers dual-drive hydraulic control motor patrol. The contractor aimed to keep 2 miles of primed subgrade ahead of the paving at all times. The time required for the prime to cure was from four to seven days.

Laying the Binder Course

On the finished and primed subgrade the contractor set 5-inch Blaw-Knox and Birmingham steel forms for the 20-foot binder and top courses. The crew used for setting the forms consisted of one foreman and about fifteen men. As the trucks with the batches covered with canvas arrived on the grade they turned through the forms and backed to the pair of spreader boxes which were set for binder or base course to spread the material 4¾ inches loose and 9 feet 8 inches wide. The trucks alternated pulling the boxes ahead as they were hooked on the chassis frame with substantial chains. There were two men to each spreader box.

Immediately after the binder course was spread 10 feet ahead by the two boxes the Jaeger-Lakewood finisher with a single asphalt screed struck off the material ⅝-inch below the top of the forms. Along the side, where the screed could not operate, two men hand-tamped the material to the same compression after raking the material to the same degree of looseness as under the screed. The base was then rolled first with a 10-ton or an 8-ton tandem Buffalo-Springfield roller, called "sealing," and then given the final compaction to the required 3½ inches with another B-S 10-ton 3-wheel steam roller.

The contractor was allowed up to 160 tons of binder material per mile of road for distortions in the subgrade due to the heavy hauling. Any hot mix required beyond the specified amount was "on the contractor".

Finishing the Top Course

The contractor followed the usual method of topping out in the morning on the previous day's run of base. The organization and methods used for the running of top were similar to base, except that there were two laborers raking in front of the screed for top and two rakers also behind the screed with a lute man and two men carrying back extra material for the so-called "edge joints." This was merely the adding of a small amount of excess material for a width of about 5 inches and for a height of ¼ inch along the edges to give extra density where ravelling would occur.

There were two men and a raker behind picking up low spots with a 10-foot straight-edge and putting in and feathering the extra material needed for the rollers to work out the low spots. The rolling was carried on in the same sequence and with the same rollers mentioned for binder-course compaction.

Shoulder and Center Stripe

The final operations on the contract were the completion of the shoulder which was 5 feet wide on either side of the road and was finished by blading and then sodded and fertilized. A 6-inch white center stripe was placed down the road as a part of the contract.

Personnel

The contractor averaged only 950 feet of the hot-mix base and top in 12 hours at the start of the work but gradually worked up to 1,300 feet with the plant working only 11 hours while the road crews worked the full 12 hours. The plant production was 600 tons in the 11-hour working period.

The contract for this 8.76-mile paving project was awarded to the Central Paving Co. of St. Louis, Mo., on its bid of $124,000.00. The contract called for completion in 120 working days. For the contractor the work was in charge of Walter P. Blackwood, President, with E. J. Jackson, Road Superintendent, Guy Mullins, Plant Superintendent, and K. K. Kahler, Top Foreman. For the Mississippi State Highway Department E. C. Brook was Project Engineer and P. I. Turner, Assistant Project Engineer.

Locating Diesel Troubles

The increasing use of automotive diesel engines and the numerous applications of small and medium-size engines make the wall chart arranged by Victor W. Pagé, M. S. A. E. for the systematic location of diesel engine troubles of help in contractors' and state and county highway shops and garages. The chart has sectional views, longitudinal and transverse, of a typical modern light diesel engine as well as diagrams of a fuel supply system, including the feed pump, the injection pump and the fuel injector.

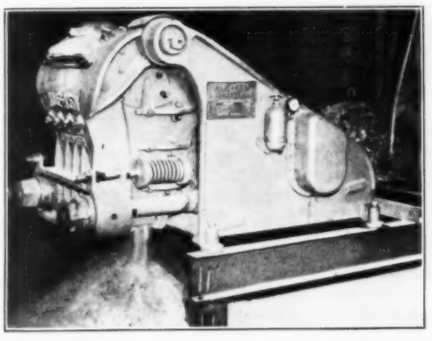
All mechanical parts are clearly indicated by arrows and named and the accompanying tabular matter summarizes the defects likely to occur, the symptoms that indicate the defective condition and the remedy for the trouble. To make the search easy for the mechanic, the troubles are summarized under various heads such as lost power, hard starting, misfiring, etc.

Copies of this chart "Systematic Location of Diesel Engine Troubles," which is printed in two colors and is 25 x 38 inches in size, may be secured from CONTRACTORS AND ENGINEERS MONTHLY. Price: 50 cents plus postage.

KUE-KEN BALANCED CRUSHER

FASTER AND FINER CRUSHING WITH THE NEW AND BETTER KUE-KEN PRINCIPLE.

NO ABRASION!



The Kue-Ken crushing principle—see the arrows. A pair of free-swinging, balanced pendulum jaws pivoted at the top. They move together and downward *with* the rock stream, no rubbing against each other. They crush without abrasion.

An un-retouched photo of a No. 50 Kue-Ken balanced crusher in action. This crusher is fastened to a temporary light steel frame which is not bolted to the floor, proving the perfect balance.

Notice the large chunks of quartz at the mouth of the jaws. These weigh as much as 90 lbs. each, the smallest 30 lbs. They are being crushed to ¼" jaw setting at the rate of 13 tons per hour, using 40 hp. With 3" jaw setting, the capacity is 60 tons per hour with 15 hp. And all this—without abrasion! No other crusher can equal it.

SOME EXCLUSIVE ADVANTAGES

1. Ability to crush large rocks very fine in a single pass.
2. Perfect balance eliminates massive foundations, permits truck mounting.
3. Sealed mechanism in filtered oil bath.
4. Rugged all-steel construction, minimum weight. Easily portable.
5. Moderate cost gives most crushing capacity for your dollar.

SEND TODAY FOR BULLETIN 600

We also manufacture Rib-cone ball mills, tables, trommels, vibrating screens, feeders, ore bin gates, etc. Bulletin No. 302.

STRAUB MFG. CO.

532 Chestnut St., Oakland, Calif.

A DARN GOOD MACHINE

"The Flex-Plane Gas Electric Finishing Machine"

The "FLEX-PLANE" gas electric 20" wide single screed finishing machine has and will finish "no slump" concrete. It walks away with 1" slump and leaves a beautiful, level riding surface. The "FLEX-PLANE" gas electric finishing machine is built low-down—with or without vibrators.

Longitudinal and transverse contraction joint installing machines—asphaltic ribbon joint—mesh strikeoff machines—expansion joint holders—forms for rubber expansion joint—finishers from 2 to 52 feet.

FLEXIBLE ROAD JOINT MACHINE COMPANY, WARREN, OHIO

A Buda-Hubron Truck-Mounted Earth Drill Sinking Holes for Foundation Piles

Deep Holes for Piles Dug with Earth Drill

On a recent contract for the Santa Fe Railroad, Campbell, Lautermilch & Lowrie Co., contractor, Chicago, Ill., used its Buda-Hubron earth drill to advantage to sink 120 holes 24 inches in diameter and 20 feet deep for cast-in-place foundation piles in record time.

Inasmuch as the work was done on either side of a large sewer, it was necessary to build scaffolding over which to drive the truck, which took considerable time, in addition to which more time was consumed in maneuvering the truck into the proper position. Another handicap was that at a depth of 6 feet, sand was encountered. In order to overcome this obstacle, steel forms slightly larger than the diameter of the holes were driven down to the clay. The drill was then operated through these forms, and the forms left in place while the concrete was poured. In spite of these conditions, the entire job was completed in five days, working three shifts a day. In one 24-hour day, 42 holes were drilled, the fastest time on any hole being 12 minutes.

The Buda-Hubron earth drill, made by The Buda Co., Harvey, Ill., has been used for years on pole-line construction work but only recently has been made available for foundation work, drainage work, and pre-boring for piles. The standard machine drills holes to 24 feet in depth and from 13 to 30 inches in diameter. For lesser depths, drills to 42 inches in diameter are available. For most construction jobs, of the type described above, The Buda Co. recommends the unit suitable for mounting on any standard truck of 1½-ton capacity or over. The machine can be mounted in the field in a few hours.

Copies of a new 8-page bulletin, No. 868A, describing and illustrating these earth drills may be secured direct from the manufacturer or from this magazine.

New Safety Lighting For Minnesota Roads

The Minnesota Highway Department has approved the installation of safety luminaires along more than 2½ miles of U. S. Routes 16 and 218 at Austin, Minn. About one hundred units, mounted on metal standards, will be installed, the State Highway Department paying for the equipment and the City of Austin paying for the installation and maintenance of the lights.

Minnesota is one of the few states where the state highway departments are assisting municipalities in the safety illumination of hazardous routes within their limits. An installation of eleven sodium luminaires on U. S. 65 at Lake City, Minn., made recently was paid for by the State Highway Department.

The Austin installation will consist of General Electric sodium luminaires and incandescent lamps. The sodium unit, which burns a 10,000-lumen lamp in horizontal position, will be of the open type with airplane reflectors to provide efficient lighting of the roadway itself, while preventing objectionable glare. The incandescent unit to be used will employ a hemispherical reflector which catches upward strays of light and directs them downward through a refractor globe, distributing the light up and down the pavement. The light source is hidden and therefore eliminates glare.

Speedy Unwatering With Propeller Pumps

The propeller type of pump is designed to handle efficiently large quantities of water at low lifts. It is particularly adaptable to fast unwatering of large excavations, as well as cofferdams. The Sterling propeller pump, built by Sterling Pump Corp., Hamilton, Ohio, consists of a suction strainer mounted on a steel frame, streamlined inlet and outlet castings, propeller blades of cast bronze finished all over, and a propeller shaft of turned and ground highly finished steel. These pumps are direct driven by electric motors or may be arranged for flat or V-belt drive if desired.

Bulletin No. 39 has recently been issued by the manufacturer, completely describing these pumps and giving all dimensions and capacities. Copies may be secured by writing direct to the manufacturer and mentioning this magazine.

Work Book of Truck Cranes

A new profusely illustrated bulletin showing Michigan truck cranes and shovels in use on a variety of jobs has recently been issued by the Michigan Power Shovel Co., Benton Harbor, Mich. These ⅜-yard models, with air controls and full-circle loading, are quickly convertible for shovel, clamshell, crane, dragline or trench hoe service and also are easily moved from job to job or from one part of a job to another where a shovel or crane is needed.

Copies of this "Work Book" may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item or from this magazine.

MAKE BIGGER PROFITS with Mall VIBRATORS

MALL vibrator powered with gas engine. Attachments can be furnished for SURFACING, DRILLING, SAWING, PUMPING and SANDING. A multi-purpose machine!

They are earning hundreds of dollars for contractors everywhere. MALL vibrators eliminate honeycombs and expensive patching, save labor and material, and produce strong, durable concrete. There is a type and size—gas engine, air, or electric—5000, 7000, or 10,000 r.p.m.—for each specific concrete job.

Our engineers will gladly help you select the MALL best suited for your work. No cost or obligation!

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Removes Hazards

As Well as Snow . . .

The winter months with their heavy snows and icy roads and streets can be made more pleasant and a whole lot safer if the snow is removed quickly and material is spread to reduce skidding. Try the Galion snow plow attachment for efficient snow removal. It is available for all makes of Galion graders. Try the Galion highway sander for spreading material on those icy roads and streets. These two units are worth your investigation . . . right now before winter sets in.

The Galion Iron Works & Mfg. Co.

Main Office & Works:
Galion, Ohio

Export Division:
Columbus, Ohio

Galion highway sander (right) designed for spreading sand, cinders, slag, slack, calcium chloride, rock salt, etc., on roads and streets against the hazards of ice and sleet. This unit covers a wide strip of surface per trip and is easily portable from place to place.

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One of the 16 ALBERT PICK HOTELS

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400 ROOMS WITH BATH FROM $2.50

V. C. MURPHY MANAGER

BEST SAMPLE ROOMS IN THE CITY

SECOND AND LUDLOW STREETS

DAYTON, OHIO

One of the Ford V-8 Cab-Over-Engine Dump Trucks Announced for 1939

1939 Ford Trucks

The 1939 line of Ford V-8 trucks and commercial cars, equipped with hydraulic brakes, comprises the widest selection of capacities, gear reduction ratios and power ever offered by the Ford Motor Co., Dearborn, Mich. With forty-two body and chassis types, two clutches, five transmission and eight rear axle ratios, in addition to various wheel and tire sizes, the line is designed to meet the requirements of all types of operations.

Three V-8 engines are available for 1939, including a new 95-hp engine with a 3.185-inch bore, a 3.75-inch stroke, a piston displacement of 239 cubic inches, and developing a torque of 170 pounds-feet at 2,100 rpm. A number of refinements have been made in the 85-hp engine. The crankshaft is heavier and larger, main bearings have been increased to 2.5 inches and in this and the 95-hp model, tungsten steel valve seat inserts are used for all valves.

The 112-inch wheelbase chassis may be powered with the 85 or a 60-hp engine, its three transmissions and three rear axle ratios providing wide applicability. There is a choice between the low reduction 3-speed transmission ordinarily used with the 60-hp engine and the standard 3-speed transmission used with the 85-hp engine. The chassis is available with stake, platform, pick-up and delivery bodies and in two drive-away types for dump or other bodies.

The 122-inch wheelbase 1-ton truck is available with a 60-hp engine and a 6.67 to 1 rear axle ratio or the 85-hp engine with a 4.86 to 1 rear axle ratio. A heavy-duty 4-speed transmission or either of two special 3-speed transmissions may be used with the 85-hp engine and a 4-speed transmission with the 60-hp engine.

A choice of either the 85 or 95-hp engine is available with the 134-inch and 157-inch wheelbase conventional and cab-over-engine trucks. The 134-inch wheelbase chassis is available with a number of bodies, including dump body and the 157-inch wheelbase is available with stake and platform body and in two drive-away types.

Introduced last spring, the line of Ford cab-over-engine trucks has been expanded by the addition of a 157-inch wheelbase unit. There are also 134 and 101-inch wheelbase chassis with a variety of bodies.

New ¾-Yard Shovel Speedy and Mobile

Two of the features of the new General 41 ¾-yard excavator, recently announced by the General Excavator Co., Marion, Ohio, are its high speed and mobility. The travel speeds are obtained through speed change gears and, in addition, the gasoline motor may be quickly accelerated at the will of the operator.

Another feature of the General 41 is its chain crowd. A split sprocket is bolted to the right-hand drum shaft and serves as a crowding unit. No special crowd unit need be placed on the machine. The boom is adjustable to all angles without affecting the crowd chain tension. Retract motion, twice the speed of the crowding motion, is obtained from a horizontal intermediate shaft which carries a friction clutch on one end and sliding gears with selective jaw clutch. This same shaft also motivates the power boom hoist, which is independent of the hoist, swing and travel motion and is of the worm and worm gear type, oil bath lubricated. An automatic band brake on the worm shaft is an added safety feature.

All high-speed shafts are ball and roller-bearing mounted. Hoist drum clutches and brakes are of the outside contracting band type with wide faces and large diameters. The clutches are set by the General Easy-Touch booster mechanism. Swing and travel motions are controlled by two friction reversing clutches of the disc type. Selective jaw clutches are used to engage either the swing or the travel motion.

Power is furnished by a 6-cylinder Buda gasoline engine developing 60-hp at 1,350 rpm or by a Buda 6-cylinder diesel developing 65 hp at 1,150 rpm. Like all General excavators, the General 41 can be changed from shovel to dragline, crane or other service on the job in a few hours' time.

A profusely illustrated bulletin called "The Candid Camera Sees the General 41" and a complete description and specifications on this new ¾-yard excavator may be secured direct from the manufacturer by mentioning this magazine.

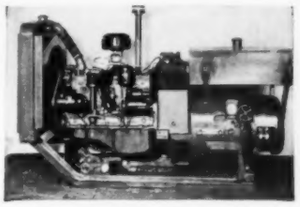
New Caterpillar Sales Mgr.

Donald A. Robison, Treasurer of the Caterpillar Tractor Co., has been made General Sales Manager of that company and W. J. McBrian, Domestic Credit Manager, has been promoted to head the Treasury Department. Mr. Robison joined the company's Western Division in 1926 and since that time has served in a number of branches of the company, finally going to the Peoria offices in 1929. Mr. McBrian has been with Caterpillar since 1928.

Engine-Driven Welder

A new welding unit for field use has recently been announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This Flexarc Model SFA 200-ampere gas-engine-driven welder is completely equipped with governor, hydraulic timing device, current indicator, polarity reversing switch, oil filter and is equipped for battery starting.

This welding generator varies the current output by means of a magnetic shunt in the armature reaction flux path. A hand wheel on the side of the generator is turned for adjustment to any desired current setting, which is easily read on a calibrated dial mounted behind a glass window in the generator frame. Power is furnished by a Chrysler Model T50 industrial engine.



The New Westinghouse Flexarc Welder of 200-Ampere Capacity

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Meet Today's Demands for *Speed* and *Durability*.

1. A Madsen Mixer drops its batch in four or five seconds less time than competitive mixers. These four-second savings can mean *an additional 36 batches every eight-hour day.*

2. Simple construction plus the use of the best abrasion-resistant irons enable Madsen Mixers to stand the heavy working strains of hard, sharp aggregates.

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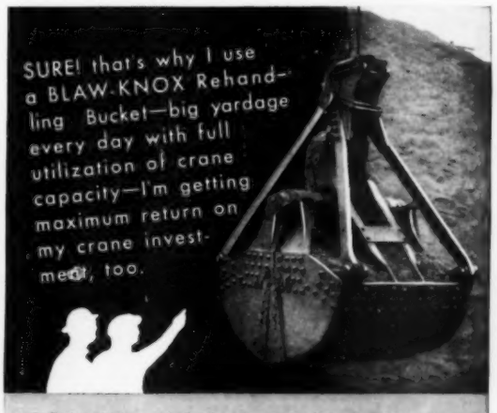
To quickly and accurately measure AGGREGATES, CEMENT AND WATER, Blaw-Knox Weighing Batchers are standard equipment in widespread use by road contractors, for general construction, material yards, and ready mixed concrete plants. They satisfy all modern specifications. Furnished for manual or automatic operation.

The reliability of Blaw-Knox Weighing Batchers is acknowledged by thousands of users. Send for Catalog No. 1566.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.

BLAW-KNOX *Aggregates and Cement* WEIGHING BATCHERS


SURE! that's why I use a BLAW-KNOX Rehandling Bucket—big yardage every day with full utilization of crane capacity—I'm getting maximum return on my crane investment, too.

Bulletin 1606 entitled Blaw-Knox Buckets for Contractors shows how to select a bucket to secure the profitable difference between peak and ordinary performance—it will be sent on request.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.

BLAW-KNOX REHANDLING BUCKETS

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do one thing and do that well—build heavy duty trailers in a plant especially designed and equipped for this purpose.

Experience and facilities combine to give the purchaser of a Rogers Trailer the greatest all round value obtainable.

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ROGERS BROTHERS CORPORATION, 188 Orchard St., Albion, Pa.

State Plows on Hired Trucks Used in Vt.

(*Continued from page 2*)

man's truck with a state plow, or a state plow on a hired truck, or to hire the entire outfit is determined entirely by costs. Costs have been increasingly in favor of state-owned plows on patrolmen's trucks supplemented by hired trucks with state plows. Each year the state has added a few more blade plows to its equipment but no heavy plowing units. The present heavy equipment owned by the state consists of two Walter trucks, two FWD trucks, six International trucks, one Linn tractor and two crawler tractors.

Maintenance of Equipment

The snow-plowing equipment is painted in the various districts but for repairs made necessary by the hard work in winter a maintenance crew is sent out each year in October from the State Highway Garage in Montpelier to the district garages to handle all repairs except the heaviest. The truck is equipped with an electric welding outfit and a hoist similar to that used by garage towing trucks. This makes possible the easy handling of repairs at the lowest possible cost. The heaviest equipment is sent in to the Garage in Montpelier in the late summer or early fall when the large trucks are going in for supplies and are not carrying any load on the inbound trip. No heavy repairs are let to local shops because of the excessive costs of work of that type where the shops are not accustomed to it.

Ice Control

The problem of ice control is of major importance in Vermont as the greater part of the state is subject to heavy sleet storms. The light snows fall mostly in the mountains and the heavy damp snow along the borders of the state. In preparation for the dangerous ice conditions the state highway forces stockpile sand in the fall throughout the state, except in the mountains where there is little trouble of this nature. The sand is mixed with about 50 pounds of calcium chloride per cubic yard of sand where the sand is to be used on concrete roads but where it is intended for use on gravel or bituminous surfaced roads common salt is used to prevent freezing of the sand. The same proportions of the chemical are used. The stockpiles are now being covered insofar as possible with sheds and other temporary coverings to prevent the accumulation of water in the stockpiles. The use of tarpaulin is limited because of the temptation to thievery.

When it comes time to use the sand on the icy roads the material is loaded by hand and the trucks are equipped with spinner-type sand spreaders. Some fifteen were bought locally last year from a Brattleboro company making the Superior materials spreader designed by the Town Engineer of that city. The advantage of this spreader is that it can handle unscreened sand with a fair amount of gravel up to ½ or ¾-inch screen size, making possible the use of sand from selected pits without screening. This affords a great saving in the cost of sanding.

On main roads where the icy condition comes with great speed at times, the regular Ross spinner spreader which is self powered is used with a fleet of trucks serving it with the sand. In this way a large mileage can be sanded in a very short time as the attaching and freeing of the spreader is only a matter of a minute or two.

Commissioner Sargent reports that there was practically no scaling of the surface of the concrete roads in Vermont before the practice of sanding the icy surfaces with a chemical-impregnated sand began. He is sure that the scaling is not a mechanical process, as on state highways laid under the same contract by the same organization both within and outside the limits of a city where the state does not sand within city limits, there has been considerable scaling on the sanded section and none across the line within the city.

Snow Fence

The state owns about 118 miles of snow fence which is erected each year when there is about 3 inches of frost in the ground so that the guy posts will hold. This is usually in November or December, according to the general weather conditions and the section of the state. The fence is removed in March and April and is stored under cover in some places where it is available but mostly out of doors in leased gravel pits or on town lots.

Costs

The costs for the fiscal year 1937-1938 ending June 30, 1938, are given in the table on page 2. The snowfall for the winter of 1936-37 was 64.9 inches and for 1937-38 it was 51.5 inches. The average snowfall for the last 10 years is 71.2 inches.

QUANTITIES AND EQUIPMENT USED FOR SNOW AND ICE REMOVAL

	1936-37	1937-38
Calcium chloride purchased	1,035 tons	640 tons
Common salt purchased	1,627 tons	1,764 tons
Miles of snow fence	112.27	117.95
State Equipment		
Motor trucks	239	246
Tractors	5	5
Power graders	3	2
Snow plows	120	120
Sand spreaders	115	115

Douglas Fir Plywood For Trench Sheeting

A new use for Douglas Fir plywood has been developed by sanitary engineers on several midwestern sewer projects by introducing plywood as sheeting material at considerable savings in cost, due to reduction in trench width, ease in handling and elimination of wales, according to reports from the Douglas Fir Plywood Association.

The replacement of the customary trench support of timber sheeting, wales and braces with simple concrete form plywood panels was carried out on four large sewer projects for the Bloom Township Sanitary District at Chicago Heights, Ill. Savings in labor costs of more than 50 per cent and in material costs of more than 80 per cent were recorded in the installation of the sheeting, according to C. H. Ashdown, District Engineer of the Bloom Township Sanitary District. Elimination of the conventional heavy sheeting and wales permits a reduction in trench width from 6 to 12 inches, with corresponding reductions in excavation and backfill.

Illustrating the savings in materials, Ashdown reported that on the West Side Chicago job 12,500 square feet of Douglas Fir plywood was sufficient for 1½ miles of 21 to 36-inch sewer, 14 to 21 feet deep. Some 75,000 feet BM of timber and lumber had been originally purchased for this job before the introduction of the panels. The panels were exposed to the severest kind of winter weather and were repeatedly re-used for four months, and when the job was completed 65 per cent were salvaged and subsequently used on the 2-mile East Side project.

Further information on Douglas Fir plywood and its many uses may be secured by interested contractors and engineers direct from the Douglas Fir Plywood Association, Tacoma Bldg., Tacoma, Wash.

STOP WINTER DELAYS
Get Summer Efficiency with
Aeroil
Concrete Heaters
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PULL *Extra* PROFITS YOUR WAY
Handle extra work with this high-speed Michigan Truck Dragline. Fingertip Air-Controls make possible more passes per hour — greater output per day — extra profits at the end of the month. Travels anywhere a truck can go — and with truck economy.
Rugged construction, from-the-ground-up, gives MICHIGAN the stability of heavier equipment and eliminates costly breakdowns and expensive schedule interruptions. Write MICHIGAN POWER SHOVEL COMPANY, Benton Harbor, Michigan.
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NEW WAYS TO CUT MATERIALS HANDLING COSTS
The flexibility and adaptability of the Porta "Model 347" sectional conveyor offers wide opportunities for cutting costs and increasing profit in the handling of concrete and aggregates.
Made up of independent sections. Can be used on wheel truck, caster mounting or on supports as permanent or semi-permanent conveyor. Easily disassembled, easily transported, easily reassembled. Our catalog describes our complete line of portable, sectional, and permanent conveyors designed to suit every contractor's requirement.
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RIGHT ON THE BOARDWALK
For Recreation Or Relaxation Choose the Chelsea
FROM $6 WITH MEALS & BATH
$3 ROOM ONLY & BATH Per Person 2 in a Room
Here you will find everything to further your comfort and enjoyment—outside ocean-view rooms . . . sun deck . . . beautiful dining room at the ocean's edge . . . superb cuisine . . . varied sports . . . and entertainment. You'll like your fellow guests . . . and the delightfully friendly atmosphere of The Chelsea.
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Conn. Overpass Design Wins Welding Award

(*Continued from page* 17)

Economy of Welding

When cast steel was estimated for the shoes the quantity used was the same as the welded slabs. Were the same strength required, the main bearing webs of the castings would have to be increased in width, thereby increasing the weight. Cast-steel shoes would have cored holes for the anchor bolts and pins. Reaming the pin holes would certainly be required, and possibly the anchor bolt holes also. Machining the casting bases, or at least rough grinding, would probably be necessary also. However, none of these possible contingencies has been taken into account in figuring the cost of the cast-steel shoes. The welded shoes need no machining on the bases and the cost of drilling anchor bolt holes and boring pin holes was taken care of in the analysis.

Another item which has been estimated high is the power cost at $0.02 per kwh. Two well established structural shops in Connecticut consider electricity as a small part of their overhead, although they do not generate their own. Owing to the great volume they use, its cost to them is about $0.01 per kwh. In many sections of the state $0.02 per kwh is the domestic rate after the consumption reaches a certain amount.

Finally the following conclusions are drawn regarding the relative costs of the welded and riveted frames: the difference in cost in favor of the welded structure is estimated at $926.04, or the riveted type is about 12 percent higher.

The above figures show the welded structure to be cheaper, in spite of the handicap of inadequate specifications, which are too conservative, and the riveted type being given the advantage of having a less accurate analysis.

The cost of field welding per day has been determined and the quantity of the operator's work carefully estimated while the wage of $1.50 per hour has been used in a vicinity near the New York labor zone where the rate is much higher and will, perhaps, affect labor at this site.

Benefit to Industry

The structural steel industry throughout its various ramifications and its coordinated industries should reap benefits of no small degree when the public becomes educated to this type of bridge.

This structure is small both in size and in cost where in these days gigantic structures are measured in terms of miles and millions. However, this case is a matter of "mass production," not a case of building one. This particular one, the first of its kind in the state, is about 100-foot span and carries a 30-foot roadway. There will be about one hundred structures required to separate all grades and cross all watercourses encountered, including major crossings over the Housatonic and Connecticut Rivers.

The majority of the bridges acting as grade separations will be of a span which can be most economically constructed of steel. Some will be of the same type as this, some single span, and in one case there is a possibility of a triple span where a railroad comes into the picture. The architectural treatment can be varied in many ways; even stone facing can be used with the steel acting only as a supporting agent, the stone alone visible on the faces.

Whatever may be the type or architectural ornamentation, etc., welding will be the means of assembling, if it can benefit the fabricator by lowering his cost and the erection costs, and thereby the cost to the public.

Small bridges play a more important part, and industry benefits more by them than the large ones because the total amount of money spent for small bridges in one year far exceeds the amount spent for the large ones in most localities in the north. For instance, the only large bridge built in Connecticut since 1920 is the one over the Connecticut River between Portland and Middletown, now nearing completion and costing about $3,000,000. Yet, since 1935 on the Merritt Parkway and other parts of the state, far more than that amount has been spent on small structures.

When a structure can be produced in steel to compare in every way in appearance to those of other materials and short-lived beauty, it is logical to assume that type will sell itself. The public buys with its eyes, and with unsightly rivets eliminated and the knowledge that the reliable and time-proved steel is in the background, there is little doubt as to the future of the welded steel frame.

Advantages to the Public

What will make its greatest appeal to the public is the fact that, excluding the strictly "utilitarian" structure, the welded bridge here presented is the least expensive type that could be built, taking all necessary qualifications into consideration. The saving on the individual structure is small, comparatively, but as the number of structures of like character increases, the saving to the public will increase more than proportionately.

It is inevitable that the motoring public will receive more for its taxes, that industry will profit by a self-promoting commodity and labor will benefit by the advent of an ever-expanding trade or profession.

New Quarry Skips Are Hauled on Trucks

The new Model LF Dempster-Dumpster, recently announced by Dempster Bros., Inc., Knoxville, Tenn., is a 2-cubic yard detachable container designed for transporting earth or rock on a 1½-ton truck, equipped with a special hydraulic hoist on the rear of the truck for raising and lowering the skip.

The unit is so designed that when the skip is raised to the truck body for hauling, 50 per cent of the load is forward of the rear axle so that there is no overhang or side sway. In hoisting the loaded container, the entire weight is supported from the center of the chassis, to eliminate frame strain and permit heavier loads.

The units have been used for a variety of purposes, such as hauling away excavated earth and rock, hauling concrete aggregate or mixed concrete, as quarry skips and similar service. Twenty of these Dempster-Dumpsters are in use at Conchas Dam in New Mexico, hauling one-man stone from the quarry to the face of the earth-fill dam for riprap.

Literature describing the new Model LF Dempster-Dumpster may be secured by interested contractors and state and county highway engineers direct from the manufacturer or from this magazine.

Dust Sampling Apparatus

The new M. S. A. Midget Impinger, recently announced by the Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa., is the latest development in dust-sampling apparatus employing the accurate impinger method. It is small, weighs less than 10 pounds, is compact and is easily portable for hand operation.

Copies of a new Bulletin No. CT-1, illustrating and describing this new Midget Impinger, may be secured by those concerned with safe working conditions on rock tunnels and similar jobs direct from the manufacturer.

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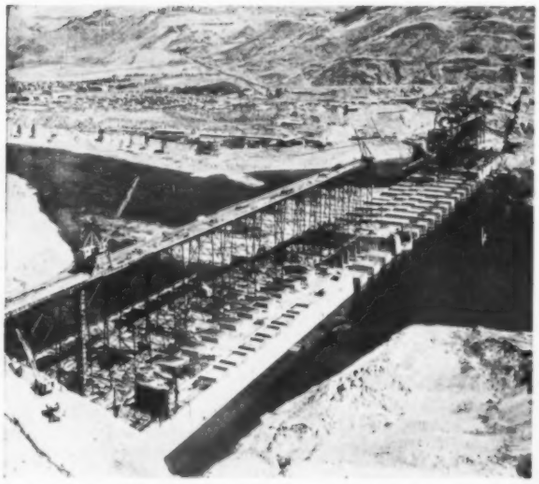
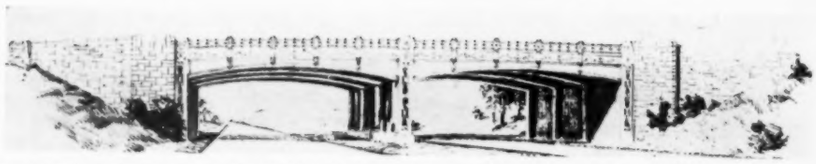


A Giant Concreting Trestle Nearing Completion Last August. This 3,600-Foot Steel Structure, From Which the Concrete for the High Dam at Grand Coulee Will Be Placed, Is Gradually Being Buried in the Concrete. See Page 21.



An Elevation Drawing of an Arc-Welded All-Steel Grade Separation Prepared by George Dunkelberger, Architectural Draftsman for the Connecticut Highway Department. This Proposed Structure, Not Yet Built, Won for Its Designers the Fourth Award in the Lincoln Arc Welding Foundation Competition. See Page 5.

C. & E. M. Photos

An Unusual Gravel Washing Plant, Designed by the Engineer of Ouachita Parish, La., Became the Pattern for More Than One Commercial Plant. At Left, the Flume Discharges Gravel and Water onto a Sloping Screen Where the Gravel Is Sized And Further Washed. See Page 1.

"De beste stuurlui staan aan wal"
(The best pilots stand on the shore)
THE SIDEWALK SUPERINTENDENTS' CLUB
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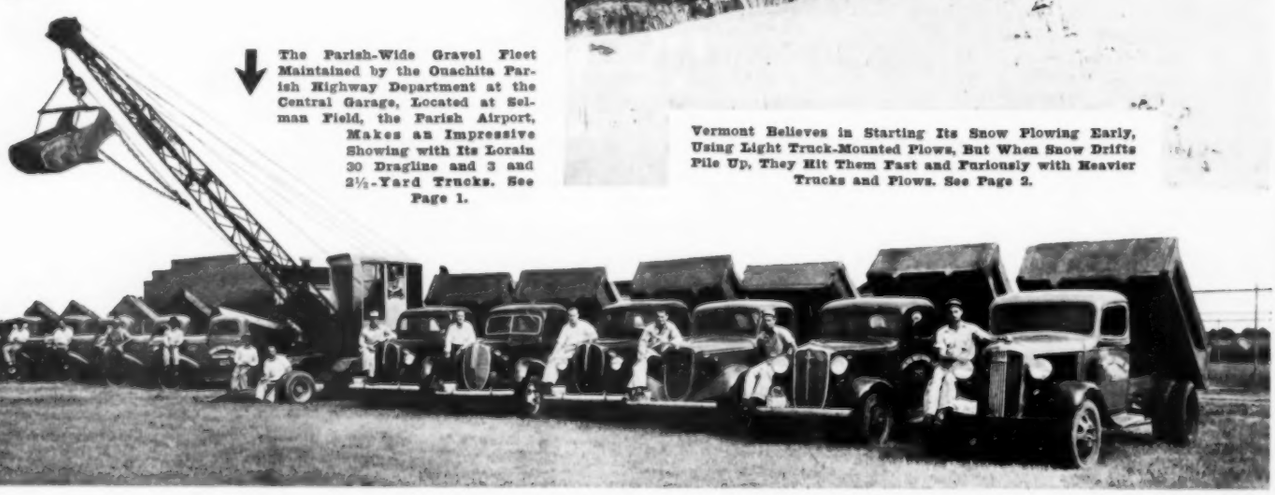
welcomes you as a charter member, and extends the privileges and courtesies of the Club to the bearer of this card.

Kibitzing in Style. The Recently Opened Sidewalk Superintendents' Club at Rockefeller Center Provides an Unobstructed View of Excavation Proceedings for a New 16-Story Building. Left, the Club Membership Card. See Page 24.

Vermont Believes in Starting Its Snow Plowing Early, Using Light Truck-Mounted Plows, But When Snow Drifts Pile Up, They Hit Them Fast and Furiously with Heavier Trucks and Plows. See Page 2.



The Parish-Wide Gravel Fleet Maintained by the Ouachita Parish Highway Department at the Central Garage, Located at Selman Field, the Parish Airport, Makes an Impressive Showing with Its Lorain 30 Dragline and 3 and 2½-Yard Trucks. See Page 1.